GEORGIA INSTITUTE OF TECHNOLOGY
OFFICE OF CONTRACT ADMINISTRATION
SPONSORED PROJECT INITIATION

Date: July 9, 1979

Project Title: Seismic Monitoring Near Wallace Dam, Georgia

Project No: G-35-653 Green card

Project Director: Dr. L. T. Long

Sponsor: Georgia Power Company

Agreement Period: From 7/1/79 Until 7/31/81

Type Agreement: Purchase Order No. WD-1078

Amount: $62,879

Reports Required: Quarterly Letter Progress Reports

Sponsor Contact Person (s):

Technical Matters

Mayor H. Thompson, Jr.
Chief, Civil Engineering Division
Georgia Power Company
P.O. Box 4545
Atlanta, Georgia 30302

Contractual Matters
(thru OCA)

J. E. Ginn
Georgia Power Company
P. O. Box 4545
Atlanta, Georgia 30302

NOTE: Continuation of G-35-621

Defense Priority Rating: N/A

Assigned to: Geophysical Sciences (School/Laboratory)

COPIES TO:

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- Division Chief (EES)
- School/Laboratory Director
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- Other

CA–3 (3/76)

GEORGIA INSTITUTE OF TECHNOLOGY OFFICE OF CONTRACT ADMINISTRATION

SPONSORED PROJECT TERMINATION SHEET

Date 6/23/82

Project Title: Seismic Monitoring at Wallace Dam

Project No: G-35-653

Project Director: Dr. Tim Long

Sponsor: Georgia Power

Effective Termination Date: 7/31/81

Clearance of Accounting Charges: _____

Grant/Contract Closeout Actions Remaining:

- [x] Final Invoice and Closing Documents
- [ ] Final Fiscal Report
- [ ] Final Report of Inventions
- [ ] Govt. Property Inventory & Related Certificate
- [ ] Classified Material Certificate
- [ ] Other _____

Assigned to: Geo. Sci. (School/Laboratory)

COPIES TO:

Administrative Coordinator	Research Security Services	EES Public Relations (2)
Research Property Management	Reports Coordinator (OCA) ✓	Computer Input
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FORM OCA 10-78I

G-35-653

GEORGIA INSTITUTE OF TECHNOLOGY
SCHOOL OF GEOPHYSICAL SCIENCES
Atlanta, Georgia 30332
(404) 894-2857

December 7, 1976

Mr. C.R. Thrasher
Georgia Power Company
P.O. Box 4545
Atlanta, Georgia 30302

Subject: Quarterly Letter Report Number 1, covering period of 1 September 1976 to 30 November 1976.

Reference: Seismic Monitoring Near Wallace Dam, Georgia.

Dear Sirs:

Work during the first quarterly report period consisted primarily of ordering parts and constructing instruments. As of November 30, 1976, the Amplifier-VCO's were about 90% assembled. We expect to be able to place them in the field by December 15, 1976 since all major components (or reasonable temporary substitutes) are currently available. The recording equipment has not been assembled as of November 30 but we expect no major problem since the timing part of the system is currently operating with the CHRA net and the other components are not complex. We expect to be recording data before January if the telephone line can be installed before then. The scheduled installation time for a project initiation in September was after 4 to 7 months or from January through March.

Conversations with Georgia Power Company Engineers indicates that at least until the communication system at Wallace dam is complete, the best mode of transmission of data to Georgia Tech is by a continuous telephone line. This line has been requested for installation by December 20, 1976.

Site evaluation is complete except for securing permission at two sites. Three sites were chosen to form an equilateral triangle with sides equal to about 19 km. These stations are:

WDG Wallace Dam Georgia
1.6 km southeast of the dam site and north of Hwy. 16.
(Georgia Power Property)

REG Rock Eagle Georgia
3.0 miles east-northeast of Rock Eagle between the communities of Rudden and Harmony

GBG Greensboro Georgia
4.0 miles south of Greensboro in the vicinity of Hutchinson Church and the Augusta Cable TV tower

A fourth station is to be located south of Eatonton Georgia (EAG) with the object of locating near the center of suspected seismic activity. This station, although a part of the net, is funded by another project.

The study of historical seismicity has been initiated with a preliminary search for evidence of events that have occurred within a 70 km radius about Milledgeville, Georgia. Instrumental records of earthquakes that have occurred recently have been ordered. Although limited, this data may allow a composite focal mechanism solution.

At this time we have no data on the occurrence of local events.

Respectfully submitted,

Leland Timothy Long
Associate Professor

LTL:cma

G-35-653

GEORGIA INSTITUTE OF TECHNOLOGY
SCHOOL OF GEOPHYSICAL SCIENCES
Atlanta, Georgia 30332
(404) 894-2857

March 8, 1977

Mr. C.R. Thrasher
Georgia Power Company
P.O. Box 4545
Atlanta, Georgia 30302

Subject: Quarterly Letter Report Number 2, covering period of 1 December 1976 to 28 February 1977.

Reference: Seismic Monitoring Near Wallace Dam, Georgia.

Dear Sirs:

Recording of seismic data began late in February 1977. Work during the second quarterly report period consisted primarily of completion of construction of instruments and installation of the instruments in the field. The phone lines were ordered in late December. Our instruments were installed and operational by late January. The phone line became operational late February. Only the tape recording system will require further work and this system is waiting on delivery of the tape recorders.

Insufficient seismic recording time prevents writing a significant report and hence, an analysis of data obtained during the latter part of February will be included in the analysis of seismic data recorded during the third quarterly report period.

Our initial evaluation of the data quality indicates that all the sites are good. The GBG site may be one of the best in the southeast.

The study of historical seismicity has been continued and is currently waiting on delivery of data from some regional studies.

Respectfully submitted,

Leland Timothy Long
Associate Professor

LTL:cma

G-35-65

GEORGIA INSTITUTE OF TECHNOLOGY
SCHOOL OF GEOPHYSICAL SCIENCES
Atlanta, Georgia 30332
(404) 894-2857

July 7, 1977

Mr. C. R. Thrasher
Georgia Power Company
P. O. Box 4545
Atlanta, Georgia 30302

Subject: Quarterly Letter Report Number 3, covering period of 1 March to 31 May 1977.

Reference: Seismic Monitoring near Wallace Dam, Georgia

Dear Sirs:

In this and subsequent letter reports, percent coverage will be defined as the percent of time during each day relative to universal time for which one or more paper records are available and are reasonably free of noise. The recording of data at one station (GBG) began on February 14, 1977. However, the phone line was not completely installed until late February.

During the period of Feburary 14, 1977 to May 31, 1977 seismic records are available for 96% of the total recording period. This corresponds to 95% (45% of the total month) for February, 92% for March, 99.6% for April, and 96% for May. The lost time is explained by high noise periods such as thunder storms, instrument failures, or recording pen problems.

Instrument problems in the field were primarily caused by transients on the phone line. We have, however, found the design fault that allows these transients to damage our instrument. The other carrier losses were caused by trees on the phone lines and a plowed up cable by someone attempting to put out a brush fire. We do not anticipate any significant additional instrument problems.

During the report period a number of regional earthquakes were recorded including the following:

23 FEB 1977	08:50 UT	Jocassee S.C.
17 MAR 1977	05:02 UT	CHRA Ga
19 MAR 1977	19:21 UT	CHRA Ga
30 MAR 1977	01:22 UT	Charleston S.C.
30 MAR 1977	08:28 UT	Charleston S.C.
14 APR 1977	12:53 UT	CHRA Ga
4 MAY 1977	02:01 UT	Meridan Miss.

In addition two large unconfirmed blasts or possible earthquakes were recorded on:

29 MAR 1977 01:22 Telco Plains Tenn.
21 APR 1977 04:33 LaGrange Ga.

Numerous smaller quarry blasts were also recorded. As many as fifteen can be identified on some days. We were also able to identify small blasts at the dam site and Siloam Quarry.

During the report period, a swarm of earthquakes was recorded as occurring in the Lake Sinclair area. A listing of these events is included with a summary of the historical seismic activity. As a consequence of that activity, a short field recording trip was performed. A report on the field trip is attached. In summary, we believe the active epicentral area probably responsible for most of recent activity is located in a remote area 9 km (5 mi) due north of the dam.

We did not identify any significant natural activity within the Wallace Dam net.

Respectfully submitted,

Leland Timothy Long
Associate Professor of Geophysics

dc
encls.
1. Historical Earthquake Summary
2. Field Trip Report

LAKE SINCLAIR TRIP # 1

The period from May 6 to May 11, 1977 indicated earthquake activity near the Lake Sinclair area, as recorded by the Wallace Dam seismic net. In lieu of this activity it was decided to investigate the area of seismicity in detail using portable micro-earthquake recorders. The trip began on the afternoon of May 11 and ended Friday evening, May 13. Instrumentation consisted of 3 smoked paper units and 2 reel to reel tape monitors. The approximate epicentral area was found using s-p times from the Wallace Dam seismic net. The portable instruments were then set up in an array around the above epicentral area (Figure 1). The instruments recorded for about 48 hours. None of the larger events recorded earlier on the Wallace Dam net occurred during the trip, but several smaller events consistent with previous recordings were detected. As a result of the trip an epicenter was computed for the 07:13:33 event from the three smoked paper units at $33^{o}13'20.4"N$ and $83^{o}12'40.2"W$ and at a depth of 0.89 Km below sea level (Figure 1). Tables 1 and 2 contain station locations and recorded micro-earthquake data, respectively.

TABLE 1

PORTABLE LAKE SINCLAIR SEISMIC STATION LOCATIONS

NO.	STA(ID)	LATITUDE	LONGITUDE	ELEVATION ft/Km
1.	LS1	33°14'16.25"	83°12'24.44"	511
		33.2378°	83.2608°	0.1558
2.	LS2	33°12'08.13"	83°13'50.19"	554
		33.1977°	83.2306°	0.1689
3.	LS3	33°13'08.28"	83°12'03.24"	391
		33.2190"	83.2009°	0.1192
4.	LS4	33°13'26.64"	83°13'36.85"	462
		33.2241°	83.2269"	0.1408
5.	LS5	33°14'11.17"	83°13'36.67"	530
		33.2364°	83.2269"	0.1615

TABLE 2

LIST OF MICROEARTHQUAKES FROM TRIP # 1

DATE	STA	PTIME	S-P (SEC)
5-12-77	LS1	05:35:21.50	0.29
5-12-77	LS1	20:49:46.20	0.23
5-12-77	LS2	20:49:46.0	?
5-13-77	LS1	00:06:26.65	0.20
5-13-77	LS1	07:13:32.60	0.25
5-13-77	LS1	11:58:10.40	0.25
5-13-77	LS2	00:06:26.85	0.42
5-13-77	LS2	07:13:33.10	0.42
5-13-77	LS2	11:58:10.80	0.48
5-13-77	LS3	07:13:32.37	0.175

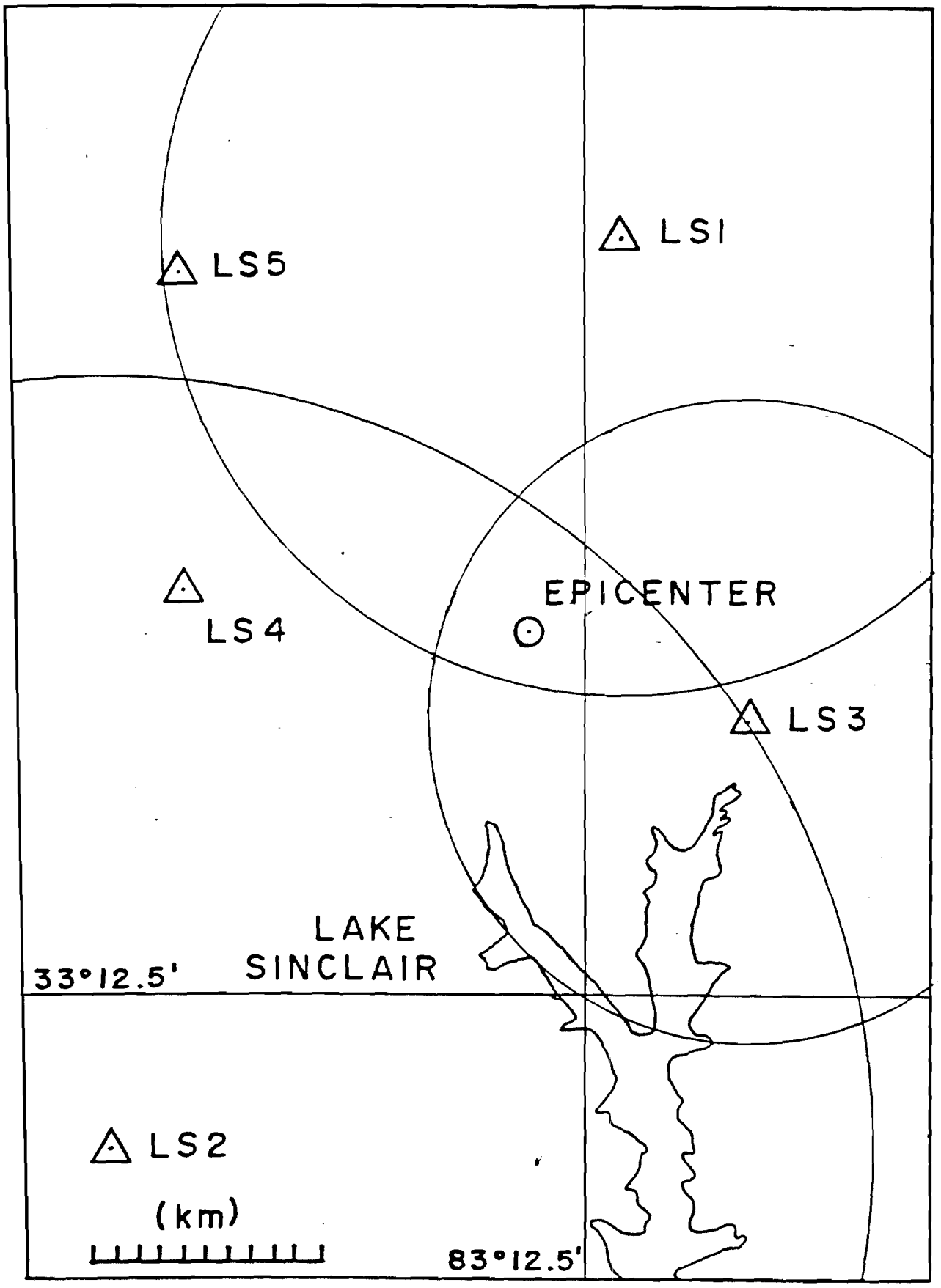


FIGURE 1

HISTORICAL SEISMICITY OF LAKE SINCLAIR REGION

The historical seismic activity under investigation was limited to within a circle centered about Milledgeville, Georgia of 70 km radius (see figure). The reasons for choosing such an area are: 1) the early locations were very qualitative and therefore actual epicenters could vary considerably 2) the area encompasses both the present Lake Sinclair and the Wallace Lake (under construction). The major towns and/or communities within this area are: Macon, Milledgeville, Eatonton, Sandersville, Sparta, and Dublin, Georgia.

The two largest earthquakes reported within the area had intensities of V MM in Milledgeville (1872) and Macon, (1964) Georgia. The largest reported magnitude was $4.4m_b$ for the 1964 event. According to various publications 10 earthquakes have occurred within this area from 1872 to 1965, roughly 10 earthquakes in 93 years (see Table I). Three of these events were recorded by the ATL (WWSS) station. The March 13, 1964 earthquake was of large enough magnitude to be recorded by 9 regional seismic observatories (see Table III).

Activity within the Milledgeville, Georgia area is continuing and the recent data are listed in Table II.

The following paragraphs and tables are historical accounts of earthquake activity which occurred within this area.

DIRECT QUOTE FROM SOUTHERN RECORDER
MILLEDGEVILLE, GEORGIA
TUESDAY, JUNE 18, 1872

EARTHQUAKE AT MILLEDGEVILLE

ABOUT 3 O"CLOCK, P.M., yesterday, our good people (lots of good people here) were startled at a sudden and loud report, resembling artillery at a distance, or the muffled report of a heavy blast. For a few seconds thereafter the shock jarred brick buildings, rattling windows and frightening some persons. What unnatural natural phenomenon it was, unless an earthquake, we cannot conceive. The warning, of sulphurous fires beneath, may have a moral effect, possibly.

DIRECT QUOTE FROM C. G. ROCKWOOD, Am. Jr. Sci. Vol ( ) 196?
1875

July 28.- A shock at 6.05 P.M., at Milledgeville, Ga., with a loud explosion. (ATLANTA, Herald)

DIRECT QUOTE FROM Union and Recorders
Milledgeville, Ga.
August 3, 1875 Page 3

EARTHQUAKE - On last Wednesday afternoon, about 6 o'clock, after a rain and hail storm, our citizens felt the shock of an earthquake. The shock was accompanied by a noise like explosion.

DIRECT QUOTE FROM C. G. ROCKWOOD, Am. Jr. Sci. Vol ( ) ?
1184

March 31.- At 5^{n} a light shock was felt at Milledgeville, Georgia.- U.S. Weather Rev.

DIRECT QUOTE FROM C. G. ROCKWOOD, Am. Jr. Sci. ( )

June 19, 1872. A sharp shock was felt about 3 P.M. at Milledgeville, Ga. Brick buildings were jarred and windows rattled.

TABLE I

LIST OF EARTHQUAKES NEAR LAKE SINCLAIR AREA

YEAR	DATE	LOCATION	TIME	LAT	LONG	INTENSITY MAGNITUDE	SQ. MI. FELT AREA
1872	June 17	Milledgeville	1500	31.1	83.3	V	
1875	July 28	Milledgeville	1805	31.1	83.3	III	
1884	Mar 31	Milledgeville	0500	33.1	83.3	III	
1885	Oct 17	Sandersville	1730	33	83	IV	
1912	Oct 22	Dublin	2015	32.7	83.5	IV	1500
1933	June 09	Eatonton	0630	33.3	83.3	Seismic?	
1964	Mar 13	Macon	01:20:18.1	33.2N	83.4N	V/($4.4M_b$)	400
		(See Earthquake Data Report attached - Table III)					
1965	July 22	Sandersville	23:55:33.3	33	83		
1965	Nov 08	Eatonton	12:58:01.0	33.2	83.4	2.7	
1965	Nov 08	Eatonton	13:04:11.5	33.2	83.4	3.7	
1968	Mar 18	Lake Sinclair	23:58				
1974	Oct 08	Eatonton	09:17:53.	33.2	83.2		
1975	Apr 01	Eatonton		33.6	83.3	3.0 ± 0.5	
1976	Aug 08	Eatonton	03 28	$33^{o}15''$	$83^{o}18'$		
1976	Aug 09	Lake Sinclair	01:56	"	"		

TABLE II

LIST OF EVENTS NEAR LAKE SINCLAIR REGION RECORDED BY WALLACE DAM SEISMIC NET

NO	DATE	STA	PTIME	S - P
5	5-10-77	ETG	07:52:21.3	1.2
6	5-10-77	ETG	17:34:20.0	1.2
7	5-10-77	ETG	21:48:17.2	1.3
9	5-11-77	ETG	14:47:32.9	1.5
10	5-11-77	ETG	15:16:49.5	1.4
8	5-11-77	ETG	08:17:52.8	?
3	5- 8-77	ETG	16:09:07.4	1.2
1	5- 7-77	ETG	08:30:07.3	1.73
2	5- 7-77	ETG	08:33:26.8	1.8
		WDG	14:47:31.9	1.1
		WDG	17:52:21.4	2.4
4	5-10-77	ETG	02:38:20.8	1.2
		WDG	02:38:19.3	1.6

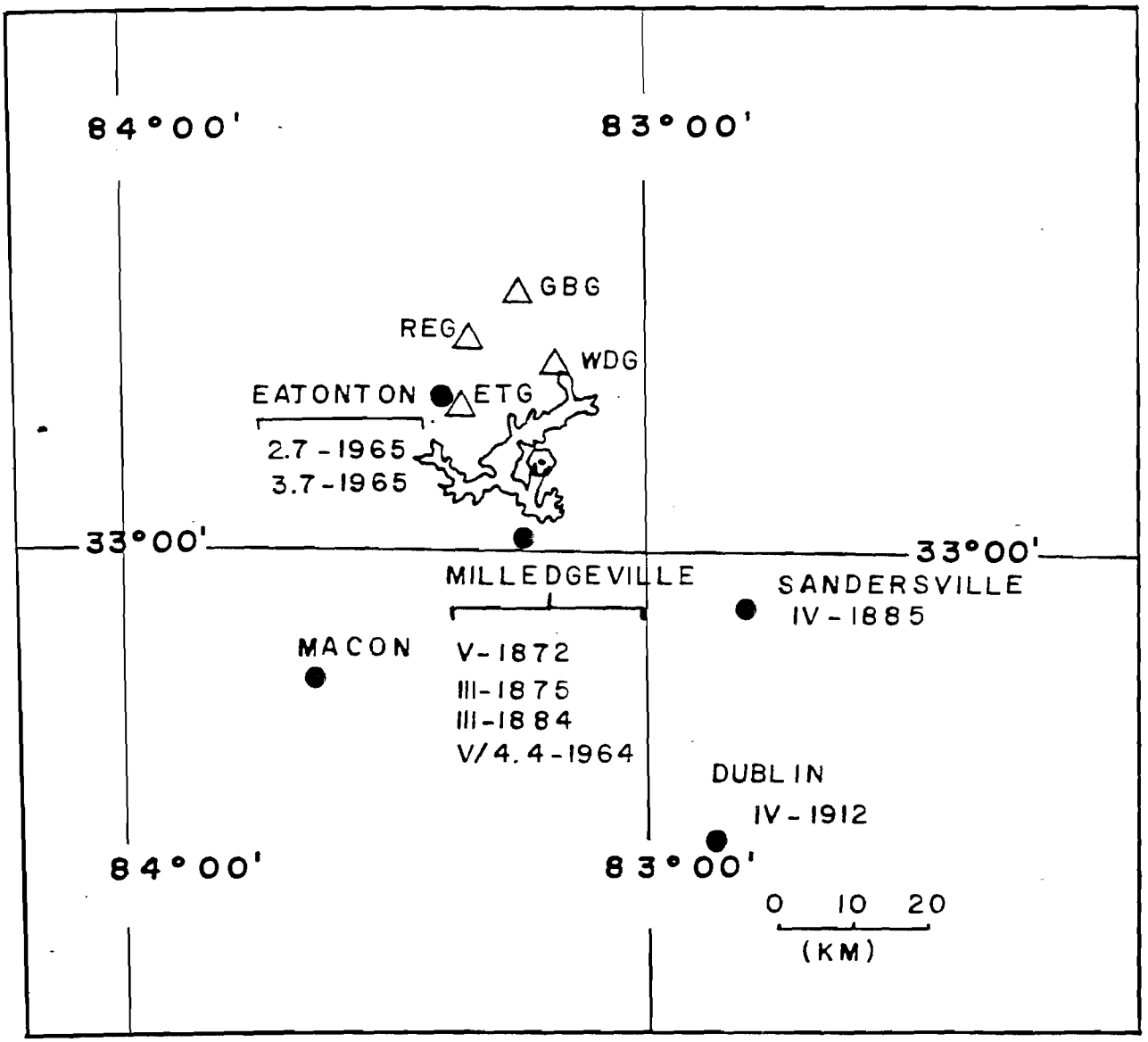
TABLE III

EARTHQUAKE DATA REPORT 1964

DATE	TIME	GMT	LAT	LONG	DEPTH	M_b	TIME CORRECTI
Mar 13	01 20	18.1	33.2N	083.4W	40Km	Mag 4.4	N 8 AVOC

Station						Probably In Error Degrees	Azimuth	Residu
ATH - IP	01 20	33.2	ES	01 20	44.7	0.9	288.6	0.8
CSC - IP	01 20	52.5				2.1	69.3	0.1
CPO - EP	01 21	06.5	T 0.6 AMP	046.5		3.0	323.8	1.6
BLA - EP	01 21	28.0	I	01 21 39.3 ES		4.7	30.1	0.7
				01 22 37.9				
OXF - EP	01 21	36.0	S	01 22 36.0		5.2	286.7	0.5
CHC - I	01 21	37.0				4.5	51.2	11.3
CNN - EP	01 21	46.5	S	01 23 20.2		6.0	351.7	0.7
FAY - E(P)	01 22	34.0				9.4	291.1	0.3
UMO - EP	01 23	18.8	T 0.5 AMP	002.4		12.7	281.2	0.5

LAKE SINCLAIR AREA



G-55-653

GEORGIA INSTITUTE OF TECHNOLOGY
SCHOOL OF GEOPHYSICAL SCIENCES

Atlanta, Georgia 30332
(404) 894-2857

October 17, 1977

Mr. C. R. Thrasher
Georgia Power Company
P. O. Box 4545
Atlanta, Georgia 30302

SUBJECT: Quarterly Letter Report Number 4, covering period of 1 June 1977 to 31 August 1977

REFERENCE: Seismic Monitoring near Wallace Dam, Georgia

Dear Sirs:

During the period of June 1, 1977 to August 31, 1977 Seismic records are available for 93.37% of the total recording period. This corresponds to 81.49% for June, 98.79% for July and 99.46% for August. The lost time is explained principally by recording pen problems.

During the report period a number of regional earthquakes were recorded including the following:

TABLE I Regional Earthquakes

5 June 1977	00:42 UT	Barnwell, S. C.
9 July 1977	02:19 UT	?
27 July 1977	04:52 UT	Franklin, Georgia (Blast?)
27 July 1977	22:04 UT	Englewood, Tenn.
19 Aug. 1977	06:30 UT	Indian Ocean (Teleseism)
25 Aug. 1977	04:20 UT	Bowman, S. C.

During the report period over 30 events were recorded from the Lake Sinclair area (see table II). Seventeen of these events were located and are shown on the attached map. These locations should be considered tentative.

We plan to review the locations when a significant number have been recorded on the magnetic tape. The Magnetic tape became operational in August and it allows an investigation of the seismograms in greater detail than is possible with only ink recorded data. The events are scatttered about the reservoir area and it is not possible to state yet whether the scatter is real or partially a consequence of reading errors. The lack of coincidence between these epicenters and those determined for events during the previous recording period is not understood.

Numerous small Quarry blasts were recorded; as many as 10 can be identified on some days.

We did not identify any significant natural activity within the Wallace Dam reservoir area.

Sincerely,

Leland Timothy Long
Associate Professor

LTL/lt

Enclosures:

1. List of events near Lake Sinclair Region (Table II)
2. Location map

TABLE II

LIST OF EVENTS NEAR LAKE SINCLAIR REGION RECORDED BY WALLACE DAM SEISMIC NET

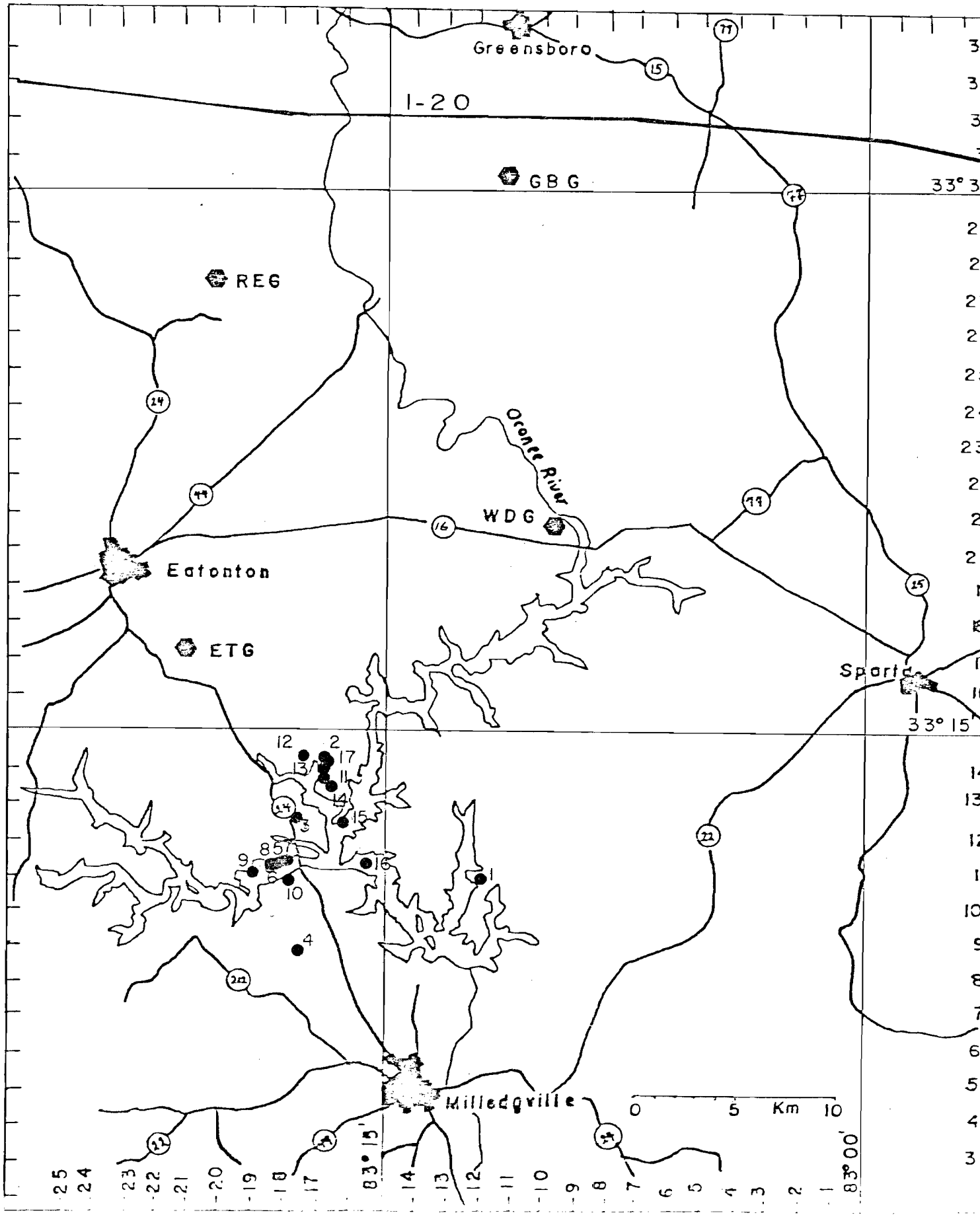
LOCATION NO.	DATE	STA	P TIME	S-P
	6-6-77	REG	07:51:15.8	3.200
	6-20-77	GBG	07:59:32.0	2.000
1	6-21-77	ETG	09:42:04.300	2.260
		GBG	09:42:07.300	4.250
		WDG	09:42:04.200	2.300
	6-25-77	GBG	04:17:04.000	3.800
2	7-4-77	ETG	14:08:26.550	1.025
		REG	14:08:29.000	2.775
		WDG	14:08:27.470	2.125
3	7-16-77	ETG	14:56:30.700	1.300
		REG	14:56:33.100	3.000
		WDG	14:56:32.000	2.400
	7-18-77	ETG	23:43:47.800	3.000
		REG	23:43:54.J30	4.950
4	7-23-77	ETG	14:56:40.600	1.220
		REG	14:56:43.000	3.550
		WDG	14:56:40.040	4.250
5	7-24-77	ETG	01:47:40.200	1.370
		REG	01:47:42.600	3.450
		WDG	01:47:41.500	2.700
6	7-24-77	ETG	11:25:13.300	1.250
		REG	11:25:16.000	3.670
		WDG	11:25:14.700	2.700
7	7-24-77	ETG	15:31:26.300	1.500
			15:31:29.000	3.750
			15:31:28.000	2.200

TABLE II (Cont.)

LOCATION NO.	DATE	STA	P TIME	S-P
8	7-29-77	ETG	00:53:05.000	1.480
		REG	00:53:07.800	3.450
		WDG	00:53:06.800	2.250
9	7-29-77	ETG	01:01:16.000	1.500
		REG	01:01:18.300	3.500
		WDG	01:01:14.600	2.630
10	7-30-77	ETG	12:22:J4.770	1.500
		REG	12:22:57.250	3.500
		WDG	12:22:56.000	2.700
	7-30-77	ETG	12:23:15.400	1.950
		REG	12:23:18.700	3.450
	7-30-77	ETG	18:30:48.30	1.250
11	8-1-77	ETG	13:15:31.000	1.000
		REG	13:15:34.000	3.000
		WDG	13:15:32.000	2.000
12	8-1-77	ETG	22:52:46.250	0.950
		REG	22:52:48.630	2.750
		WDG	22:52:47.500	2.000
13	8-4-77	ETG	14:08:26.550	1.030
		REG	14:08:29.000	2.770
		WDG	14:08:24.470	2.130
	8-5-77	ETG	05:09:17.300	1.250
		REG	05:09:19.950	2.950
	8-5-77	ETG	07:19:05.983	1.225
		REG	07:19:08.738	2.750
14	8-5-77	ETG	07:33:37.350	0.950
		REG	07:33:39.600	2.900
		WDG	07:33:38.150	2.200
15	8-13-77	ETG	09:54:27.500	1.260
		REG	09:54:29.520	3.500
		GBG	09:54:31.000	3.950
16	8-13-77	ETG	09:57:0.000	2.000
		REG	09:57:2.570	3.250
		GBG	09:57:3.750	4.200

TABLE II (Cont.)

LOCATION NO.	DATE	STA	P TIME	S-P
	8-18-77	ETG	21:23:05.200	1.600
		REG	21:23:07.750	3.200
	8-19-77	ETG	13:06:10.450	3.872
		GBG	13:06:09.500	3.400
	8-19-77	ETG	23:32:00.050	1.000
		REG	23:32:02.000	3.850
	8-20-77	ETG	12:01:13.270	1.500
		REG	12:01:15.700	3.200
	8-20-77	ETG	19:10:34.500	1.325
		REG	19:10:37.250	3.000
	8-25-77	ETG	03:47:28.225	1.400
		REG	03:47:30.750	3.050
17	8-31-77	ETG	16:56:42.600	1.200
			16:56:45.000	2.750
			16:56:43.600	2.000


Greensboro
I-20
GBG
REG
WDG
Oconee River
Eatonton
ETG
Sparta
Milledgville
33° 30'
33° 15'
83° 15'
83° 00'
0 5 Km 10
1
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G-35-65

GEORGIA INSTITUTE OF TECHNOLOGY
SCHOOL OF GEOPHYSICAL SCIENCES
Atlanta, Georgia 30332
(404) 894-2857

December 16, 1977

Mr. C. R. Thrasher
Georgia Power Company
P. O. Box 4545
Atlanta, Georgia 30302

SUBJECT: Quarterly Letter Report Number 5, covering period of 1 September 1977 to 31 November 1977.

REFERENCE: Seismic Monitoring near Wallace Dam, Georgia

Dear Sirs:

During the period of September 1, 1977 to November 31, 1977; Seismic records are available for 94.83% of the total recording period. This corresponds to 100.00% for September, 97.17% for October and 96.66% for November. The post time is principally due to recording pen problems.

During the report period, a number of regional earthquakes were recorded including the following:

TABLE 1 Regional Earthquakes

7 September 1977	13:42 U.T.	Jocassee
28 October 1977	07:00 U.T.	?
28 October 1977	13:53 U.T.	?
4 November 1977	11:22 U.T.	Mississippi
30 November 1977	09:50 U.T.	?

Numerous small Quarry blasts were recorded. They are identified by their character, time of day and location.

We did not identify any significant natural activity within the Wallace Dam reservoir area.

Attachments:

1. List of microearthquakes near Lake Sinclair region (Table II)
2. Location map (enlarged) of the events near Lake Sinclair region for the period September 1 - November 31, 1977. An enlarged map was used because of the large number and concentration of events.
3. Composite map of the location of activity since June, 1977.

The composite map will accompany subsequent reports to show the relative locations of the events that occur during each report period. The old events (recorded during previous report periods) will be shown as small dots while those recorded in the period of the report will be indicated by large black circles.

Sincerely,

Leland Timothy Long
Associate Professor

LTL:kp

TABLE II

LIST OF LAKE SINCLAIR AREA EVENTS RECORDED BY WALLACE DAM SEISMIC NET

LOCATION NO.	DATE	STATION	P TIME	S-P
1	9-2-77	ETG	04:46:02.660	1.250
		REG	04:46:05.000	3.000
		WDG	04:46:03.750	2,050
2	9-2-77	ETG	22:49:21.375	1.375
		REG	22:49:23.750	3.000
		WDG	22:49:22.250	2.325
3	9-19-77	ETG	13:09:44.400	1,200
		REG	13:09:42.5	3.000
		GBG	13:09:48.8	3.750
4	9-20-77	ETG	03:05:10.625	1.187
		REG	03:05:13.000	3.000
		WDG	03:05:11.300	2.200
		GBG	03:05:13.950	4.000
	9-21-77	REG	17:32:21.750	3.000
		WDG	17:32:21.300	2.800
		GBG	17:32:19.500	1.200
	10-6-77	WDG	04:07:44.525	2.350
	10-12-77	ETG	04:46:36.100	1.125
5	10-30-77	ETG	16:36:11.900	1.000
		REG	16:36:14.200	2.700
		GBG	16:36:15.375	3.620
	11-4-77	ETG	14:47:41.500	2.125
		REG	14:47:41.250	2.425
		GBG	14:47:41.425	2.000
6	11-7-77	ETG	01:34:21.000	1.300
		REG	01:34:23.550	3.200
		WDG	01:34:21.800	2.100
		GBG	01:34:24.750	4.000

TABLE II (Cont.)

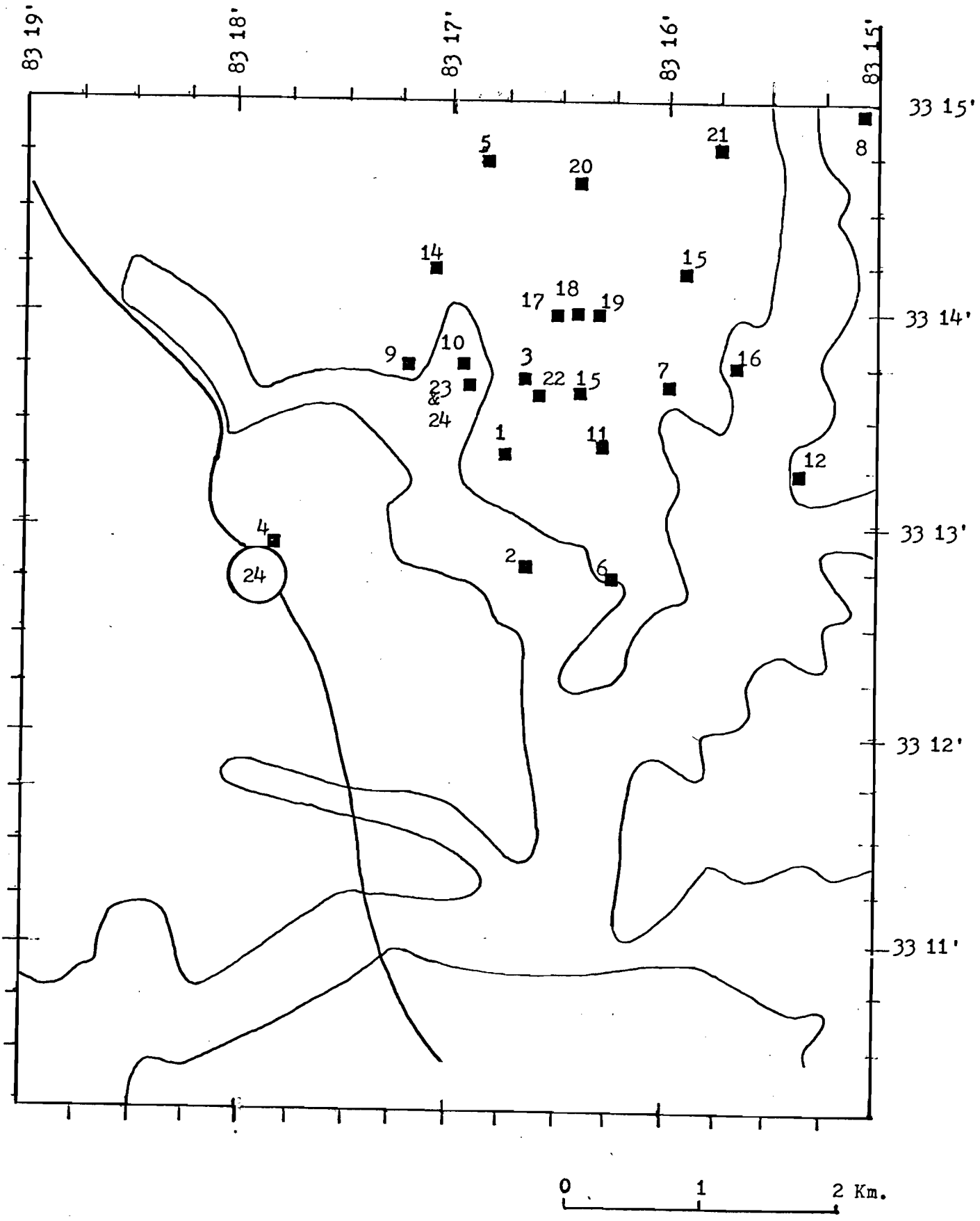
LOCATION NO.	DATE	STATION	P TIME	S-P
7	11-20-77	ETG	05:08:24.600	1.250
		REG	05:08:27.150	3.000
		GBG	05:08:28.000	3.750
8	11-20-77	ETG	20:08:12.500	1.000
		REG	20:08:15.000	2.800
		GBG	20:08:15.200	3.500
9	11-21-77	ETG	08:11:40.125	1.112
		REG	08:11:42.900	2.950
		GBG	08:11:43.400	3.750
10	11-21-77	ETG	08:55:45.280	1.125
		REG	08:55:47.750	2.750
		GBG	08:55:48.750	4.000
11	11-21-77	ETG	12:01:50.375	1.250
		REG	12:01:52.750	3.000
		GBG	12:01:53.800	3.950
	11-21-77	ETG	21:12:28.700	1.162
	11-21-77	ETG	21:18:55.480	1.250
	11-22-77	ETG	05:30:04.000	1.000
		GBG	05:30:07.250	3.740
	11-22-77	ETG	05:45:32.870	1.125
	11-22-77	ETG	08:44:03.000	1.380
		GBG	08:44:07.100	3.700
12	11-23-77	ETG	10:01:43.050	1.475
		REG	10:01:45.500	3.250
		GBG	10:01:46.500	3.650
	11-23-77	ETG	19:04:40.400	1.125
13	11-23-77	ETG	19:43:59.875	1.250
		REG	19:44:01.850	3.000
		GBG	19:44:03.200	3.750
14	11-23-77	ETG	19:45:48.000	1.089
		REG	19:45:50.500	2.750
		GBG	19:45:51.625	3.750

TABLE II (Cont.)

LOCATION NO.	DATE	STATION	P TIME	S-P
	11-23-77	ETG	22:30:43.000	1.000
		REG	22:30:44.500	2.750
		GBG	22:30:45.500	3.750
15	11-24-77	ETG	01:10:40.625	1.000
		REG	01:10:42.750	3.000
		GBG	01:10:43.750	3.750
16	11-24-77	ETG	15:07:54.775	1.250
		REG	15:07:57.000	3.000
		GBG	15:07:58.000	3.750
17	11-24-77	ETG	17:59:12.812	1.225
		REG	17:59:15.375	2.750
		GBG	17:59:16.300	3.800
18	11-24-77	ETG	20:10:28.000	1.250
		REG	20:10:30.800	3.000
		GBG	20:10:31.300	3.750
	11-25-77	ETG	05:19:13.125	1.250
		GBG	05:19:16.500	3.775
19	11-25-77	ETG	08:53:52.425	1.125
		BEG	08:53:54.800	2.900
		GBG	08:53:55.800	3.750
	11-25-77	ETG	08:54:00.500	1.000
20	11-25-77	ETG	09:03:23.625	1.125
		REG	09:03:26.100	2.500
		GBG	09:03:27.050	3.500
	11-25-77	ETG	09:04:48.250	1.188
		GBG	09:04:50.221	3.750
	11-25-77	ETG	11:24:45.875	1.000
		GBG	11:24:49.100	3.950
21	11-26-77	ETG	08:38:46.750	1.200
		REG	08:38:48.950	2.750
		GBG	08:38:50.250	3.500
22	11-26-77	ETG	21:50:44.175	1.200
		REG	21:50:47.150	3.000
		GBG	21:50:47.600	3.750

TABLE II (Cont.)

LOCATION NO.	DATE	STATION	P TIME	S-P
23	11-27-77	ETG	01:43:38.625	1.200
		REG	01:43:41.000	2.900
		GBG	01:43:41.950	3.800
	11-27-77	ETG	01:44:49.625	1.000
		GBG	01:44:42.750	3.750
24	11-27-77	ETG	01:54:38.000	1.200
		REG	01:54:40.250	2.900
		GBG	01:54:41.450	3.800
	11-27-77	ETG	01:56:30.150	1.225
		GBG	01:56:33.900	3.750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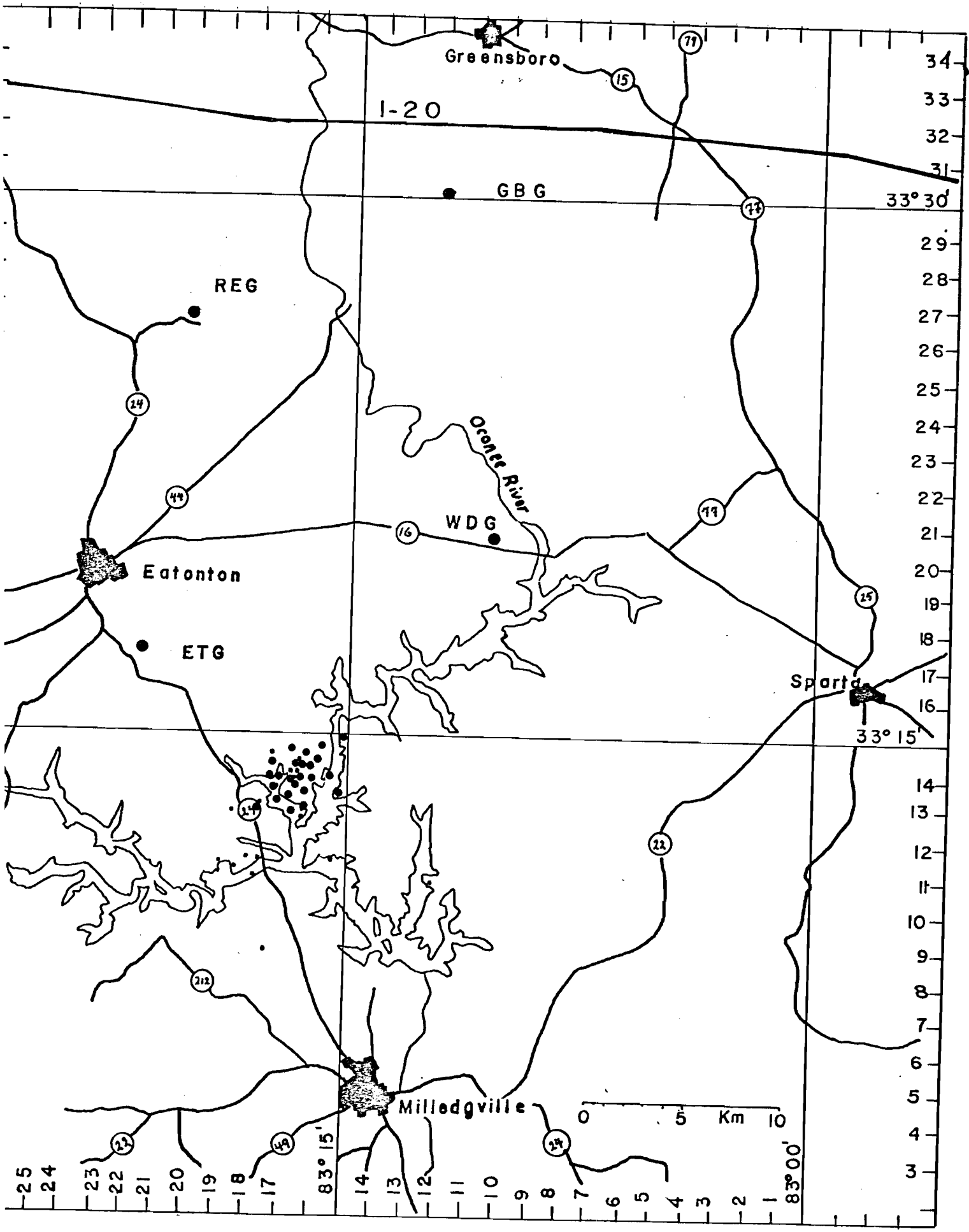
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GBG
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Oconee River
WDG
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ETG
Sparta
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Milledgville
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G-35-65

March 30, 1978

Mr. C. R. Thrasher
Georgia Power Company
P.O. Box 4545
Atlanta, Georgia 30302

SUBJECT: Quarterly Letter Report Number 6, Covering Period of 1 December 1977 to 28 February 1978.

REFERENCE: Seismic Monitoring near Wallace Dam, Georgia

Dear Sirs,

During the period of December 1, 1977 to February 28, 1978, seismic records are available for 99.71% of the total recording period. This corresponds to 99.52% for December, 100% for January and 99.61% for February.

The lost time is principally due to recording Pen Problems.

During this report period and in subsequent report periods magnitudes will be computed for regional and local events. Magnitude is actually a relative, arbitrary and imprecise measure of an earthquake. Magnitude is particularly difficult to apply to local events because of the variability in the source function and the local crustal structure. The common magnitudes (m_b, M, M_L, M_{bLg}) cannot be applied at distances less than 20 km. Also, most are to be applied to 1.0 Hertz waves which are not easily measured at close distances or on instruments like in the Wallace Dam Net which are designed to record 10 to 30 Hertz waves. The Wallace Dam system was designed to optimize detection of small and local events. For simplicity we are assuming a magnitude scale based on duration. The equation for the magnitude is MD = -2.87 + 2.44 log D and was developed by Gill Bollinger for BLA. It now appears that this may not be entirely appropriate for the Wallace Dam area. As soon as sufficient data are available we will develop our own local duration magnitude and correlate it with MBLG at station ATL. A revised listing of magnitudes will be given at that time. The MD values may be considered accurate to one unit and precise to 0.4 magnitude units.

Starting with this reporting period the latitude and longitude of local events will be listed whenever an event is located.

During this period, a number of regional earthquakes were recorded and are listed on Table 2.

Numerous quarry blasts were recorded during this report period, but are not tabulated. They are identified by their character, time of day and location.

Microearthquakes occuring during this report period in the Lake Sinclair area are listed in Table II and their locations are shown on the enclosed location map as large circles. The composite activity occuring since June 1, 1977 is shown as small dots on the same map. No enlarged map is necessary due to the scattering of epicenters of the local activity during the period.

We did not identify any significant natural activity within the Wallace Dam reservoir area during the report period of 1 December 77 to 28 February 78.

Respectfully submitted.

Leland Timothy Long
Associate Professor of Geophysics

Attachments (3)

LTL/gh

TABLE I

REGIONAL EARTHQUAKES

14 DEC 77	02:40 UT	MD+ = 2.0 ± .2	Summerville, Ga.*
15 DEC 77	07:16 UT	MD = 3.5 ± .3	Summerville,
16 DEC 77	11:15 UT	MD = 1.7 ± .2	Western, N.C.
16 DEC 77	11:25 UT	MD = 1.7 ± .2	Western, N.C
26 DEC 77	04:50 UT	MD = 2.0 ± .2	Near JSC Station, S.C.
26 DEC 77	05:36 UT	MD = 3.8 ± .4	Puerto Rican trench
31 DEC 77	02:41 UT	MD = 1.2 ± .2	Kiowee, S.C.
7 JAN 78	03:02 UT	MD = 1.2 ± .1	Kiowee, S.C.
8 JAN 78	11:35 UT	MD = 2.6 ± .2	Alabama - Mississippi border
18 JAN 78	05:14 UT	MD = 1.1 ± .1	Jocassee, S.C.
19 JAN 78	22:44 UT	MD = 1.2 ± .1	Chattanooga, Tennessee
25 JAN 78	08:30 UT	MD = 1.6 ± .2	Near JSC Station, S.C.
25 JAN 78	09:29 UT	MD = 2.2 ± .1	Jocassee, S.C.
4 FEB 78	09:15 UT	MD = 1.4 ± .2	Near JSC Station, S.C.
11 FEB 78	01:21 UT	MD = 1.5 ± .2	Jocassee, S.C.
16 FEB 78	02:15 UT	MD = 2.0 ± .2	Near JSC Station. S.C.
22 FEB 78	12:13 UT	MD = 1.8 ± .2	Near JSC Station, S.C.
23 FEB 78	00:31 UT	MD = 1.6 ± .1	Near JSC Station, S.C.
23 FEB 78	02:54 UT	MD = 1.6 ± .1	Near JSC Station, S.C.
25 FEB 78	04:03 UT	MD = 2.8 ± .2	South of JSC.Station, S.C.

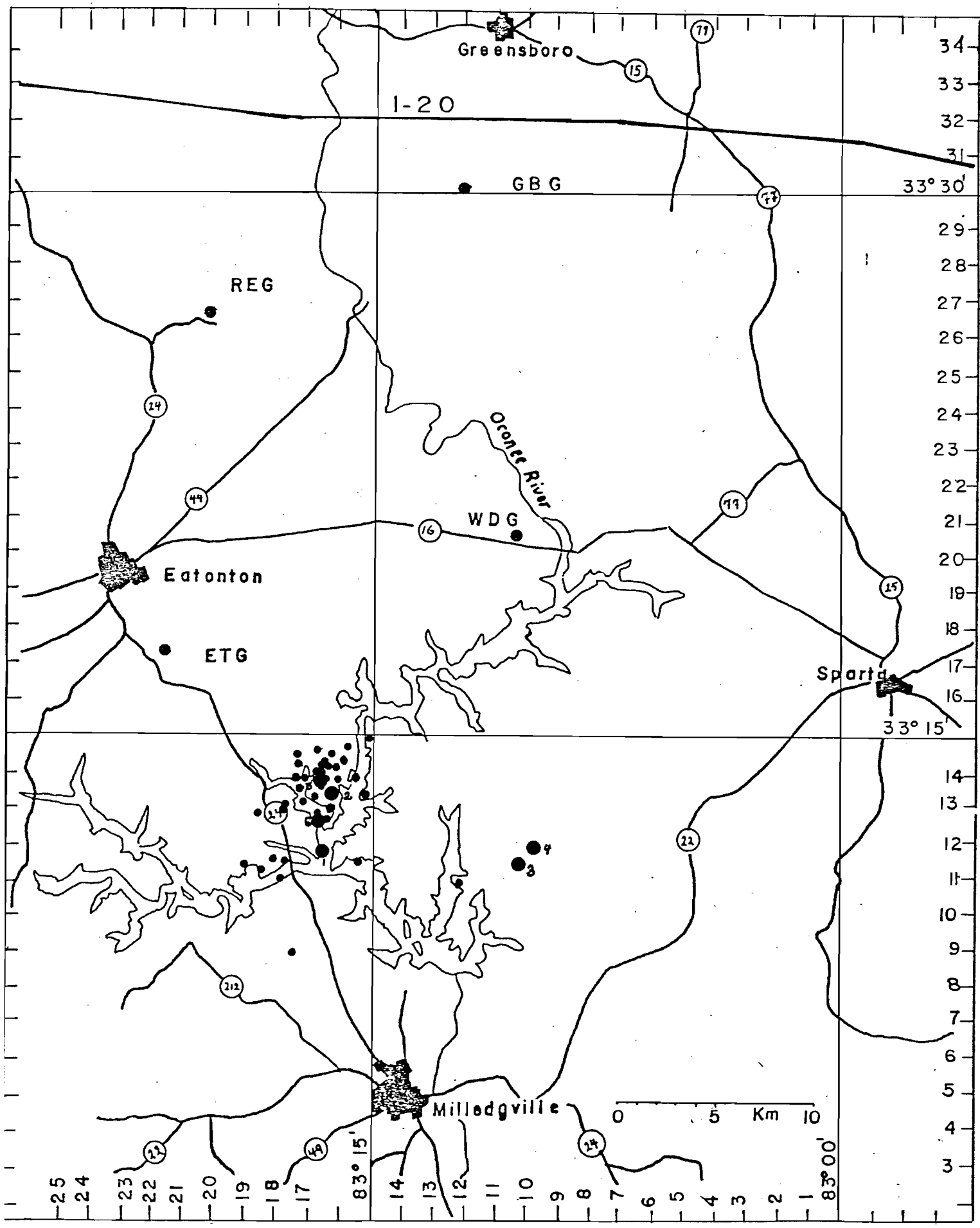
*Latitudes and longitudes have not been given for these events because they fall outside our seismic net. Without data from other stations in S.C. or Tenn. the locations would not have sufficient precision.

+ MD = -2.87 + 2.44 Log(D) where D is total duration

TABLE II

LIST OF LAKE SINCLAIR AREA EVENTS RECORDED BY WALLACE DAM SEISMIC NET

location no.	date station name	origin time (UT) P - time (UT)	latitude S-P (time)	longitude	Magnitude (MD)
1	3 DEC 77	00:08:37.69	33°,11.7'	83°,16.6'	2.5 ± .2
	ETG	00:08:39.812	1.487		
	REG	00:08:42.350	3.400		
	GBG	00:08:43.450	4.250		
	13 DEC 77	13:10:34.000			
	ETG	13:10:37.350	2.550		
	REG	13:10:39.950	4.250		
	26 DEC 77	13:18:48.200			
	ETG	13:18:49.800	1.162		
	17 JAN 78	17:10:7.450			
	ETG	17:10:9.850	1.750		
2	7 FEB 78	05:33:54.36	33°,13.34'	83°,16.24'	.9 ± .1
	ETG	05:33:56.250	2.500		
	REG	05:33:58.400	3.000		
	GBG	05:34:00.000	3.750		
3	7 FEB 78	12:30:14.05	33°,11.31'	83°,10.48'	.5 ± .05
	ETG	12:30:17.700	2.400		
	REG	12:30:19.200	4.000		
	WDG	12:30:17.200	2.100		
4	8 FEB 78	19:45:33.13	33°,11.82'	83°,9.90'	.5 ± .05
	ETG	19:45:36.900	2.200		
	REG	19:45:38.300	3.950		
	GBG	19:45:38.900	4.400		
5	12 FEB 78	01:02:01.20	33°,13.55'	83°,16.82'	1.6 ± .2
	ETG	01:02:05.400	1.300		
	REG	01:02:05.400	2.900		
	GBG	01:02:06.600	3.800		
6	16 FEB 78	08:06:08.99	33°,12.46'	83°,16.75'	.5 ± .05
	ETG	08:06:11.100	1.450		
	REG	08:06:13.375	3.200		
	WDG	08:06:12.150	2.250		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I-20
GBG
REG
Oconee River
WDG
Eatonton
ETG
Sparta
33° 30'
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Milledgville
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83° 15'
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G-35-65

GEORGIA INSTITUTE OF TECHNOLOGY
SCHOOL OF GEOPHYSICAL SCIENCES

Atlanta, Georgia 30332
(404) 894-2857

April 28, 1978

Mr. C.R. Thrasher
Georgia Power Company
P.O. Box 4545
Atlanta, Ga. 30302

Subject: Special Report on Suspected Seismic Activity in the Wallace Dam Area

Reference: Seismic Monitoring Near Wallace Dam, Georgia

Dear Sirs:

The first purpose of this letter report is to inform Georgia Power Company of the occurrence of minor seismic activity which has deviated from the normal pattern of activity. Most of the activity reported on in previous quarterly reports has been closely associated with the Lake Sinclair reservoir area and could be attributed to minor induced seismic activity. The recent events were located outside an area which could be influenced by the reservoir. Some of these events may prove to be explosions and if any can be proven to be explosions we would appreciate information on their exact locations. The second purpose of this letter is to recommend placement of a station south of the Lake Sinclair area to improve locations.

Seven possible events in all with anomalous locations were recorded. Data concerning their arrival times and locations are given in Table 1. Their locations are plotted on Figure 1.

Event number 1 was well recorded at three stations and has a larger shear phase and weak surface wave characteristic of earthquakes (see copy of tape playback). Event number 2 also lacks the surface wave characteristic of shallow focus events and explosions hence, we believe that both of these are valid earthquakes. In both cases, a local survey of the epicenter areas revealed no evidence that these could be explosions.

Event number 3 is in an area of surface mining but its relatively high-amplitude shear-wave and early morning occurrence time imply a natural event.

Events 4 and 5 occurred within two minutes of each other and are perhaps too large to be explosions. They also have the shear-wave character of an earthquake and occurred in the early morning.

Events 6 and 7 may be blasts since they show relatively large surface waves and occur at a typical time for a blast (~5:00 P.M.). However, we are not aware of a quarry at that location.

I would like to recommend the addition of a new seismic station in the vicinity of the Lake Sinclair Dam. The preferred area is indicated on Figure 1, but a final location would have to await investigation of available phone service. The primary reason for this recommendation is that such a station would provide better location control on events which occur in the Lake Sinclair area outside of the Wallace Dam net. While I realize the primary objective of the Wallace Dam net is to monitor the Wallace Dam area, high quality data from the adjacent Lake Sinclair area would be useful in defining the character of the seismicity to be expected near the Wallace Dam reservoir.

If you wish to discuss this recommendation further please contact me at any time. The installation would require an increase in funding amounting to about $1,200 for the station installation and phone line charges at $46.50/month plus line charges if applicable. I would also recommend an additional recorder and discriminator at about $2,000.

Respectfully submitted,

Leland Timothy Long
Associate Professor

LTL:nlg
Encl.

P.S. After preparation of this report a swarm of about 15 events occurred on May 1, 1978. These events are located near Lake Sinclair and will be listed in the quarterly report.

TABLE 1

Special Events in Lake Sinclair Area

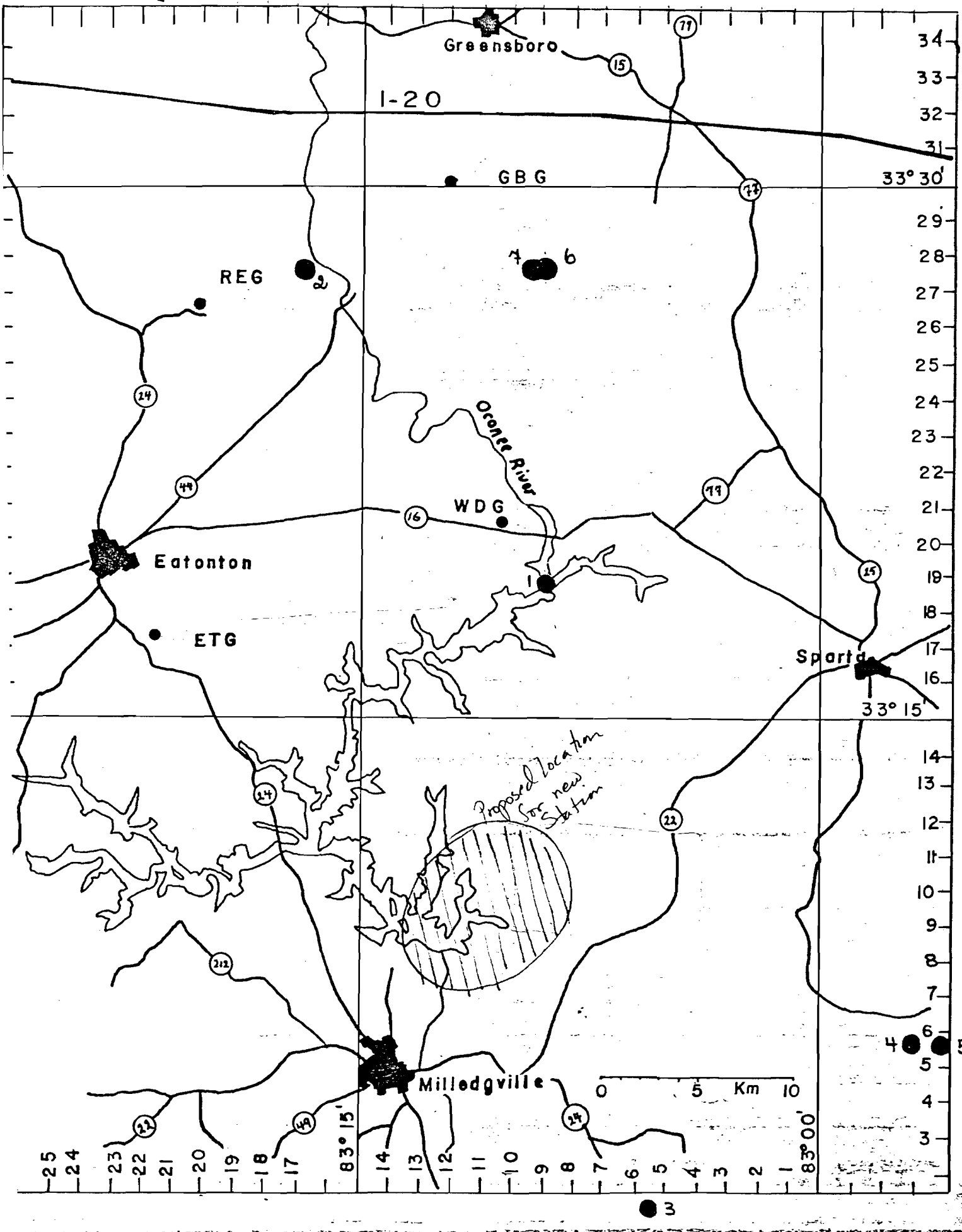
During March, 1978

Location No.					
1	March 2, 1978	ETG	P-08:08:57.375 UT	S-P 2.250	MD = 1.0
		GBG	P-08:08:57.800 UT	S-P 2.750	MD = 1.25
		WDG	P-08:08:55.070 UT	S-P 0.520	MD = 1.0
		Average MD = 1.10 ± .1			
		Latitude	33°, 18.85'		
		Longitude	83°, 9.11'		
2	March 10, 1978	ETG	P-07:25:52.980 UT	S-P 2.500	MD = 1.5
		GBG	P-07:25:51.000 UT	S-P 1.000	MD = 1.8
		WDG	P-07:25:52.200 UT	S-P 2.000	MD = 1.8
		Average MD = 1.65 ± .2			
		Latitude	33°, 27.44'		
		Longitude	83°, 16.75'		
3	March 12, 1978	ETG	P-09:43:32.000 UT	S-P 5.000	MD = .5
		GBG	P-09:43:35.000 UT	S-P 6.750	MD = .5
		WDG	P-09:43:31.840 UT	S-P 4.510	MD = .4
		Average MD = 1.5 ± .3			
		Latitude	33°, .48'		
		Longitude	83°, 5.53'		
4	March 20, 1978	CH5	P-12:26:47.950 UT	S-P 11.410	MD = 2.0
		CH6	P-12:26:48.550 UT	S-P 11.800	MD = 1.8
		GBG	P-12:26:40.850 UT	S-P 6.000	MD = 1.6
		WDG	P-12:26:38.000 UT	S-P 4.150	MD = 2.2
		Average MD = 1.9 ± .3			
		Latitude	33°, 5.66'		
		Longitude	82°, 57.09'		
5	March 20, 1978	CH5	P-12:28:31.850 UT	S-P 11.410	MD = 1.6
		CH6	P-12:28:33.000 UT	S-P 11.800	MD = 1.4
		GBG	P-12:28:25.700 UT	S-P 6.000	MD = 1.2
		WDG	P-12:28:22.250 UT	S-P 4.150	MD = 1.8
		Average MD = 1.5 ± 3			
		Latitude	33°, 5.53'		
		Longitude	82°, 56.20'		

Table 1 Con't
Special Events in Lake Sinclair Area
March, 1978

Location No.						
6	March 21, 1978	ETG	P-19:21:30.650 UT	S-P	3.320	MD = .65
		REG	P-19:21:29.250 UT	S-P	2.200	MD = .55
		WDG	P-19:21:28.350 UT	S-P	1.500	MD = .6
		Average MD = .60 ± .1				
		Latitude	33°, 27.67'			
		Longitude	83°, 9.00'			
7	March 29, 1978	ETG	P-21:05:57.750 UT	S-P	3.320	MD = 1.0
		REG	P-21:05:56.000 UT	S-P	2.050	MD = 1.0
		WDG	P-21:05:55.300 UT	S-P	1.550	MD = .75
		Average MD = .9 ± .1				
		Latitude	33°, 27.76'			
		Longitude	83°, 9.11'			

Figure (1)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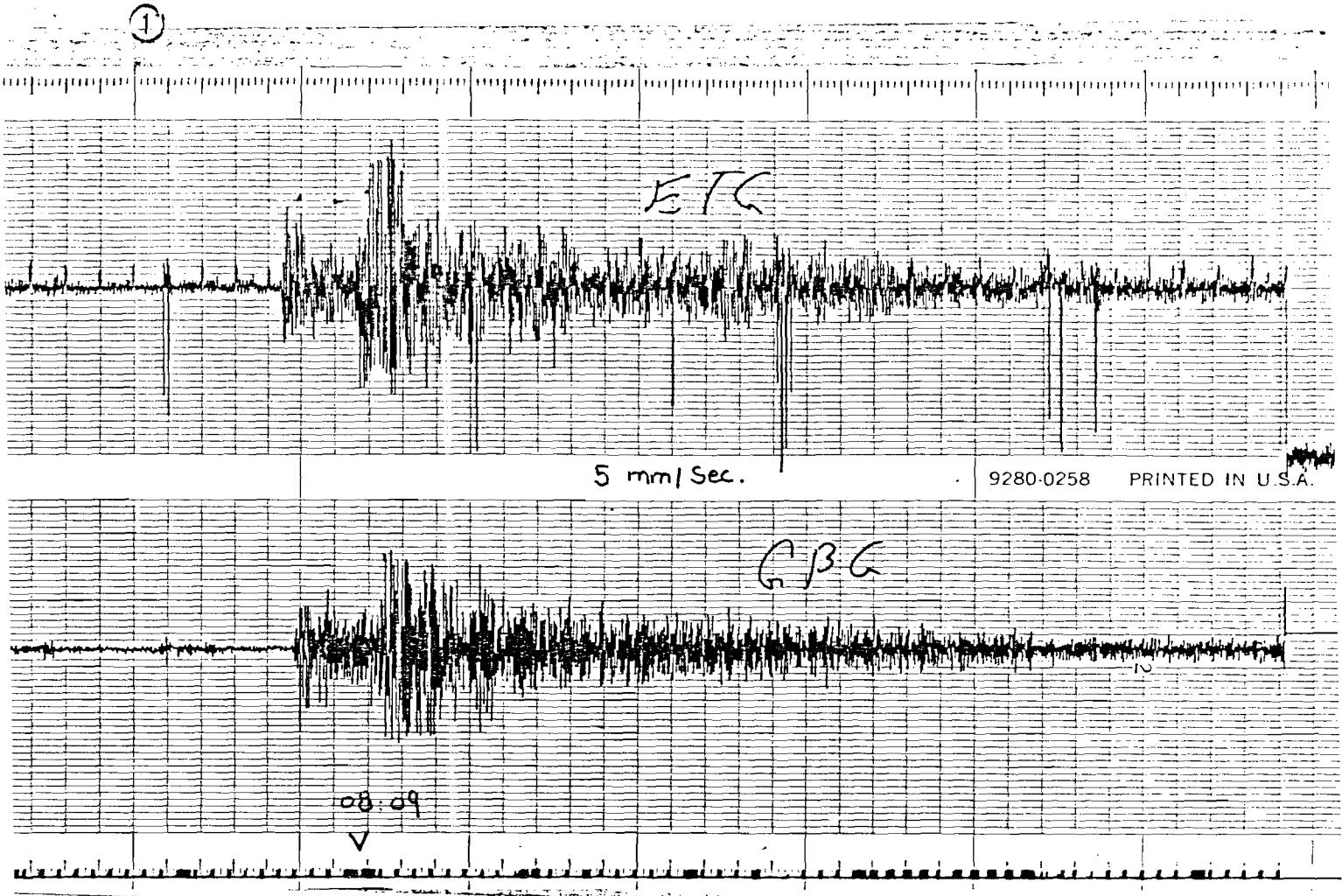
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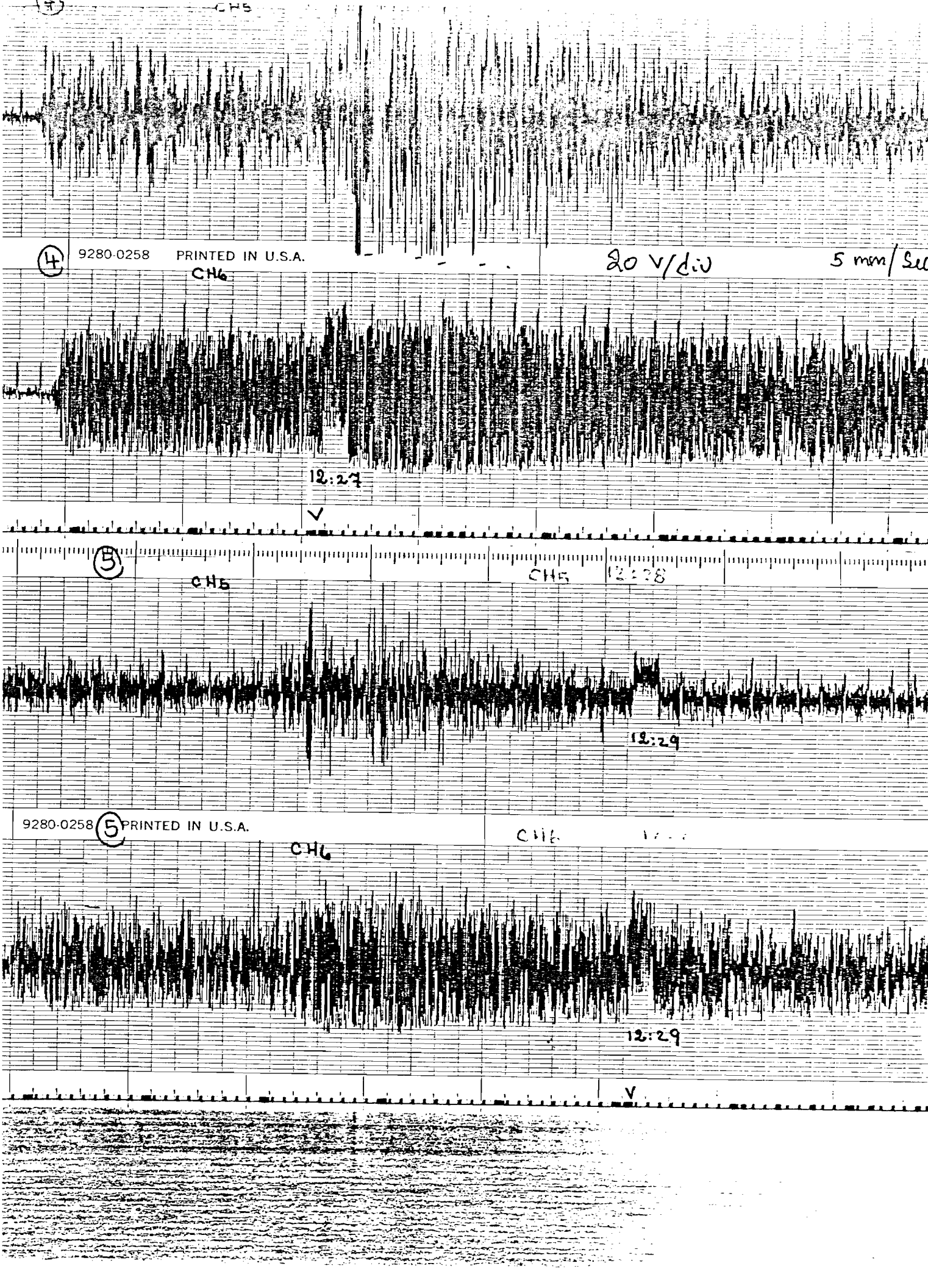
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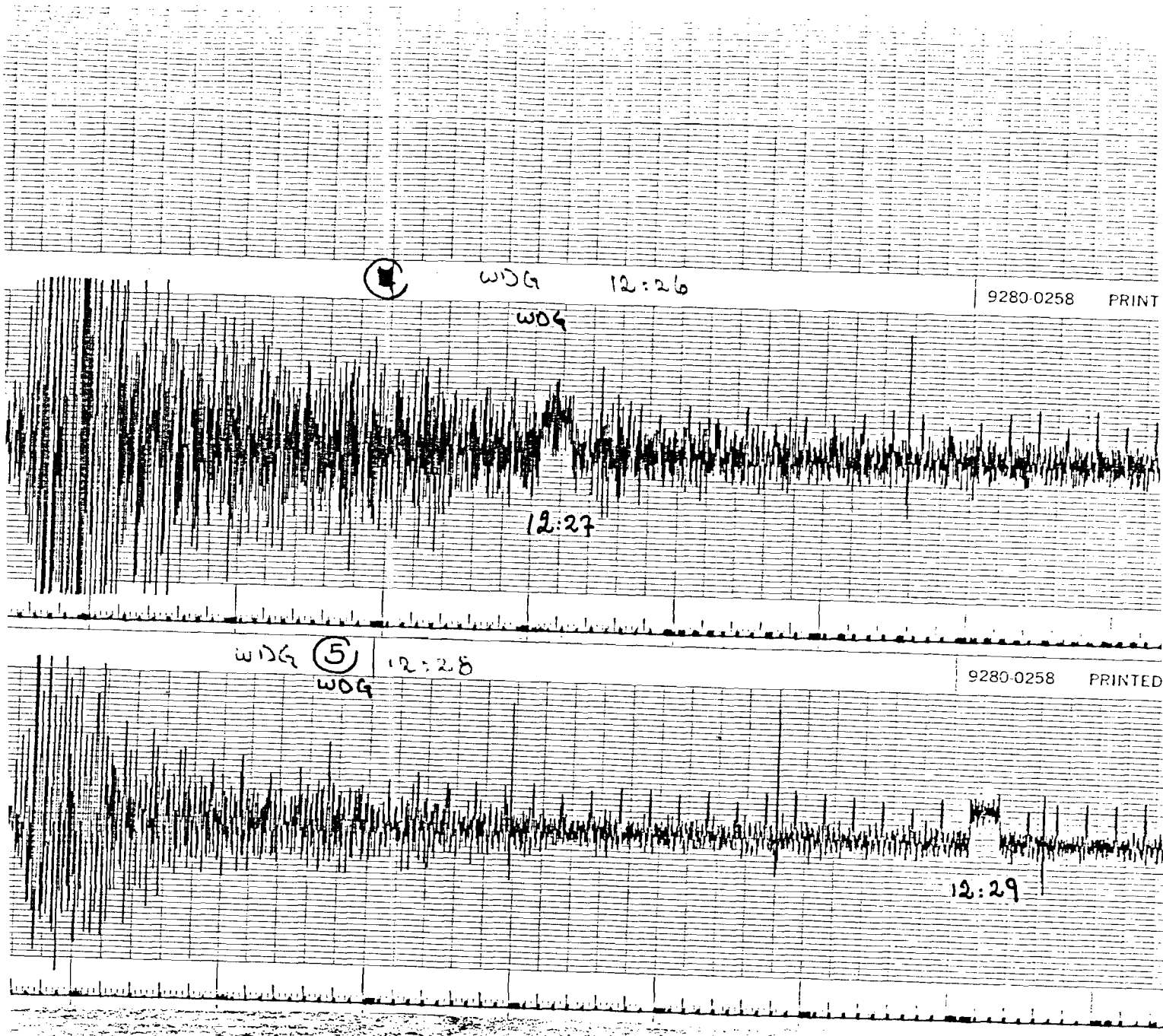
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GEORGIA INSTITUTE OF TECHNOLOGY
SCHOOL OF GEOPHYSICAL SCIENCES
Atlanta, Georgia 30332
(404) 894-2857

June 30, 1978

Mr. C.R. Thrasher
Georgia Power Company
P.O. Box 4545
Atlanta, Ga. 30302

Subject: Quarterly Letter Report Number 7, covering period of 1 March 1978 to 31 May 1978

Reference: Seismic monitoring near Wallace Dam, Georgia

Dear Sir:

During the period from 1 March 1978 to 31 May 1978 seismic records from the Wallace Dam seismic net recorded data for 99% of the total available recording time. This corresponds to 100% for March, 100% for April and 98% for May. The lost time is explained primarily by phone line transmission problems. Signals from two stations were lost for over one week in May because of an attenuator installed on the line by mistake by the local phone company.

A special report was submitted in March 1978 describing seismic events located at new epicenters. A possible new site for a seismic station was recommended.

During the period covered by this report, over 20 regional earthquakes were identified. The more significant events are listed in Table 1.

The locations of the regional events are computed from all available stations. However, for those events outside of Georgia, the locations may be uncertain and should be considered provisional.

Numerous quarry blasts were recorded during this report period, but are not tabulated. They are identified by their character, time of day and location.

Microearthquakes occurring during this report period in the Lake Sinclair area are listed in Table II and their locations are shown on the enclosed location map as large circles. The composite activity occurring since June 1, 1977 is shown as small dots on the same map.

One possible microearthquake was located within the Wallace Dam reservoir area during the report period of 1 March 1978 to 31 May 1978.

Respectfully submitted,

Leland Timothy Long
Associate Professor of
Geophysics

LTL:nlg

Attachments (3)

Table I Regional Activity

Date	MD	P-arrival time	Latitude	Longitude	Notes
1 Mar 1978	1.7	04:09 UT	34.57°	86.13°	Huntsville, Alabama
3 Mar 1978	2.2	15:19 UT	36.65°	83.56°	Middleborough, Kentucky
22 Mar 1978	1.6	15:53 UT	36.80°	81.50°	Boone, N.C.
2 Apr 1978	1.4	02:20 UT	35.56°	81.19°	(?) North Carolina
19 Apr 1978		11:35 UT			Bermuda
22 Apr 1978		6:36 UT	34:20°	81.21°*	near Jenkinsville, S.C.
24 Apr 1978		05:49 UT			Bermuda
28 Apr 1978	1.6	17:25 UT	34.75°	82.45°	Seneca, S.C.
4 May 1978		05:47 UT			Bermuda
15 May 1978	1.4	09:52 UT	35.00°	82.90°	Jocassee, S.C.
20 May 1978	1.5	22:03 UT	34.94°	84.32°	Blue Ridge (NW GA)
21 May 1978	1.6	23.00 UT	34.72°	84.54°	Blue Ridge (NW GA)
					possible blasts
23 May 1978	1.0	08:10 UT	34.20°*	81.50°*	near Jenkinsville, S.C.
23 May 1978	1.3	08:18 UT	34.20°*	81.50°*	near Jenkinsville, S.C.

*Many events were identified as originating at the JSC station area but because of their number only a few were listed. Locations for events in central South Carolina are very uncertain if based on stations in Georgia only.

Table II

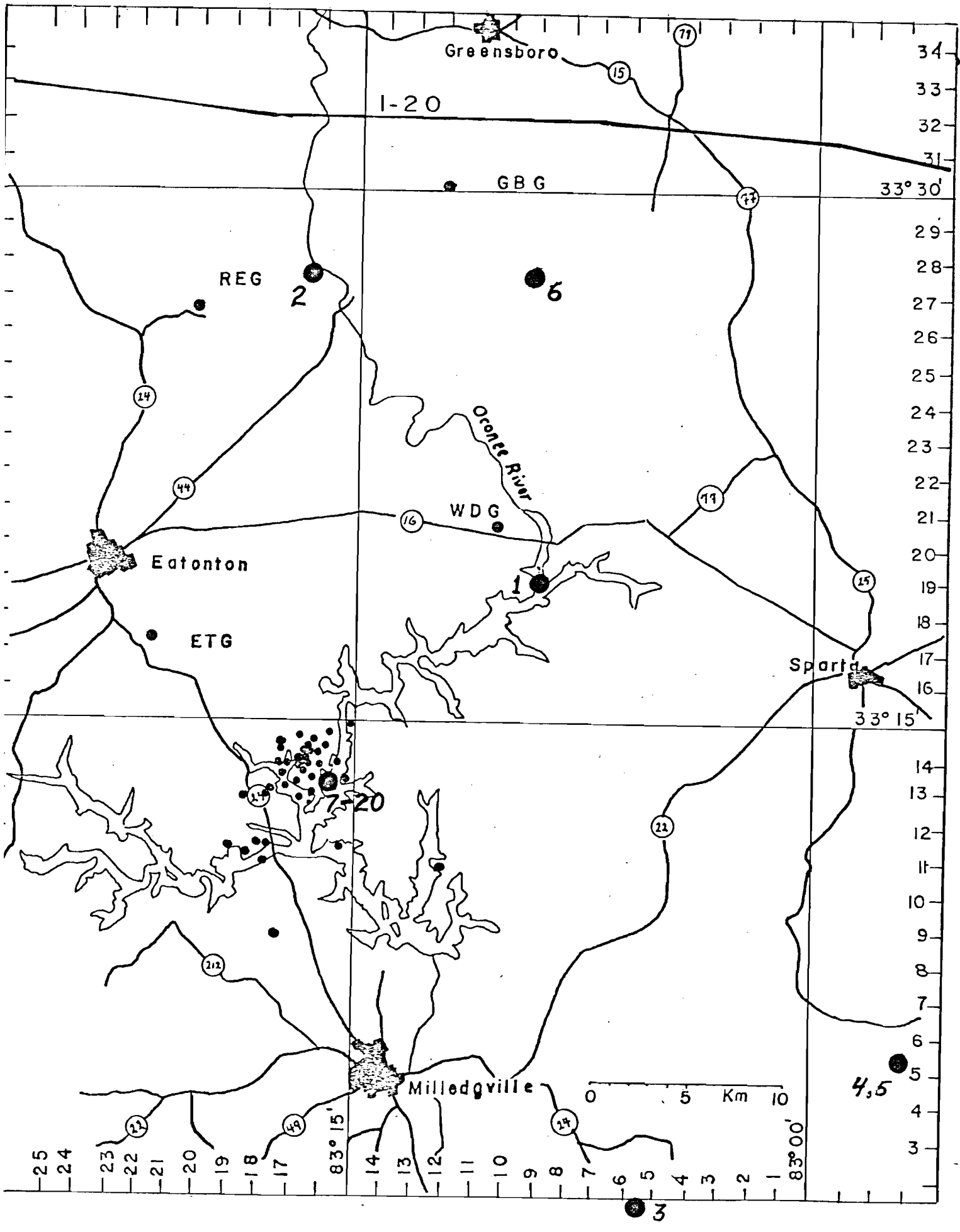
List of Events near Lake Sinclair Area

from 1 March-31May 1978

Location No.	Date	STA	P-time	S.P.	Magnitude	Latitude	Longitude
1	3-2-1978	ETG	08:08:57.375	2.250	1.1	33° 18.85'	83° 9.11'
		GBG	08:08:57.800	2.750			
		WDG	08:08:55.070	0.520			
2	3-11-1978	ETG	07:25:52.980	2.500	1.6	33° 27.44'	83° 16.75'
		GBG	07:25:51.000	1.000			
		WDG	07:25:52.200	2.000			
3	3-12-1978	ETG	09:43:32.000	5.000	1.5±.3	33° 0.48'	83° 5.53'
		GBG	09:43:35.000	6.750			
		WDG	09:43:31.840	4.510			
4	3-20-1978	GBG	12:26:40.850	6.000	1.6±.3	33° 5.66'	82° 57.09'
		WDG	12:26:33.000	4.150			
		CH6	12:26:48.550	11.800			
		CH5	12:26:47.950	11.410			
5	3-20-1978	GBG	12:28:25.700	6.000	1.4±.2	33° 5.66'	82° 57.09'
		WDG	12:28:22.250	4.150			
		CH6	12:28:33.000	11.800			
		CH5	12:28:31.850	11.410			
6	3-29-1978	ETG	21:05:57.750	3.320	possibly Saloun Quarry		
		REG	21:05:56.000	2.050		33° 27.76'	83° 9.11'
		WDG	21:05:55.300	1.550			
	4-23-1978	ETG	17:52:02.700	1.280	0.0	33° 14.13'	83° 15.49'
		REG	17:52:05.000	2.450			
7	5-1-1978	REG	21:29:34.250	2.925	2.3±.2	33° 13.2'	83° 16.2'
		WDG	21:29:32.925	2.000			
		GBG	21:29:35.250	3.680			
		CH5	21:29:47.650	12.700			
		CH6	21:29:47.750	12.800			
8	5-1-1978	REG	21:40:56.000	2.950	0.3	33° 13.2'	83° 16.2'
9	5-2-1978	REG	00:53:28.000	2.925	0.4	33° 13.2'	83° 16.2'
10	5-2-1978	REG	01:09:30.500	2.750	0.3	33° 13.2'	83° 16.2'
		WDG	01:09:21.200	2.350			
		GBG	01:09:31.500	3.750			
11	5-2-1978	REG	01:24:22.375	2.750	1.0	33° 13.2'	83° 16.2'
		WDG	01:24:21.000	2.300			
		GBG	01:23:23.400	3.750			
12	5-2-1978	REG	01:26:14.475	2.325	0.4	33° 13.2'	83° 16.2'
13	5-2-1978	REG	01:29:26.975	2.850	0.5	33° 13.2'	83° 16.2'
		WDG	01:29:26.120	2.000			

Table II (cont.)

Location No.	Date	STA	P-time	S.P.	Magnitude	Latitude	Longitude
14	5-2-1978	REG	01:46:01.850	2.900	Main event of sequence		
		WDG	01:46:00.750	2.150	2.4±.2	33° 13.2'	83° 16.2'
		GBG	01:46:02.953	3.750			
		CH5	01:46:15.000	13.250			
		CH6	01:46:14.750	12.500			
		RMG	01:46:33.750	25.750			
15	5-2-1978	REG	01:55:03.980	2.875	0.3	33° 13.2'	83° 16.2'
16	5-2-1978	REG	02:04:06.000	2.925		33° 13.2'	83° 16.2'
		WDG	02:04:05.125	2.250			
17	5-2-1978	REG	02:53:23.980	2.875	0.4	33° 13.2'	83° 16.2'
		WDG	02:53:22.550	2.000			
		GBG	02:53:25.000	3.750			
18	5-2-1978	REG	02:55:03.980	2.875	0.5	33° 13.2'	83° 16.2'
		WDG	02:55:02.525	2.275			
		GBG	02:55:04.700	3.750			
19	5-2-1978	REG	03:17:15.250	2.900	0.4	33° 13.2'	83° 16.2'
		WDG	03:17:14.250	2.000			
20	5-2-1978	REG	04:50:55.500	2.750	0.3	33° 13.2'	83° 16.2'


Greensboro
I-20
GBG
REG
2
6
Oconee River
WDG
Eatonton
ETG
1
Sparta
33° 15'
33° 30'
7-20
Milledgville
0 5 Km 10
4,5
3
83° 15'
83° 00'

G-35-653

GEORGIA INSTITUTE OF TECHNOLOGY
SCHOOL OF GEOPHYSICAL SCIENCES
Atlanta, Georgia 30332
(404) 894-2857

September 12, 1978

Mr. C. R. Thrasher
Georgia Power Company
P. O. Box 4545
Atlanta, Georgia 30302

RE: Quarterly Letter Report Number 8, covering the period of 1 June 1978 to 31 August 1978

Dear Sir:

The total cumulative percentage recording coverage for the Wallace Dam Net for the period June 1st to August 31st, 1978 was 99.23%. This corresponds to a cumulative percentage of 100% for June, 100% for July, and 97.7% for August. The lost time was due to recording equipment and telephone communication system failures.

During this report's period, over 30 regional earthquakes and Teleseisms were detected, the most significant of these are tabulated in Table I.

Numerous quarry blasts were recorded during this report period, but these were not tabulated. They were identified by their characteristic phases, time of the day, and location.

Seismic activity for the period of this report in the Lake Sinclair-Wallace Dam area is tabulated in Table II.

The enclosed map shows the distribution of the seismic activity around the Lake Sinclair area. A significant change in the activity is the reoccurrence of events in the area near ($33^{o}14'$,$83^{o}12'$). This area was identified as active during the early phases of the installation of the seismograph net around the Wallace Dam area - but has been quiet until this report period. It appears that the active areas can be quiet for periods of up to a year. An important question we can not answer yet is whether these active areas represent areas of prolonged aftershock activity related to larger previous events or whether they may also present a potential for larger events to occur in the future. A station near or just northeast of the Lake Sinclair Dam site would be very helpful in locating these events.

One event was located within the proposed Wallace Dam Reservoir area (Location number 16), but it is probably a blast at the Siloam quarry.

Respectfully submitted,

Leland Timothy Long
Associate Professor of Geophysics

LTL/dp

TABLE I

Regional Seismicity

Date	Time	M_b Duration	Location
June 9, 1978	23:15	--	Tennessee
June 11, 1978	05:28	1.8	CHRA, Ga.-S.C.
June 12, 1978	06:33	1.7	CHRA, Ga.-S.C.
June 16, 1978	09:43	1.5	JSC Station area, S.C.
June 16, 1978	20:40	2.0	Dalton, N.W. Ga.
June 17, 1978	04:10	1.3	JSC Station area, S.C.
July 24, 1978	08:06	--	Gulf of Mexico
August 4,1978	08:48	2.3	Dalton area, N.W. Ga.
August 13, 1978	22:55	--	Santa Barbara, California
August 21, 1978	23:15	1.8	Dalton area, N.W. Ga.
August 27, 1978	10:23	2.0	JSC Station area, S.C.
August 27, 1978	10:58	1.3	JSC Station area, S.C.
August 28, 1978	03:50	1.2	JSC Station area, S.C.
August 31, 1978	00:30	--	

Table II

Seismic Activity in the Lake Sinclair-Wallace Dam Area

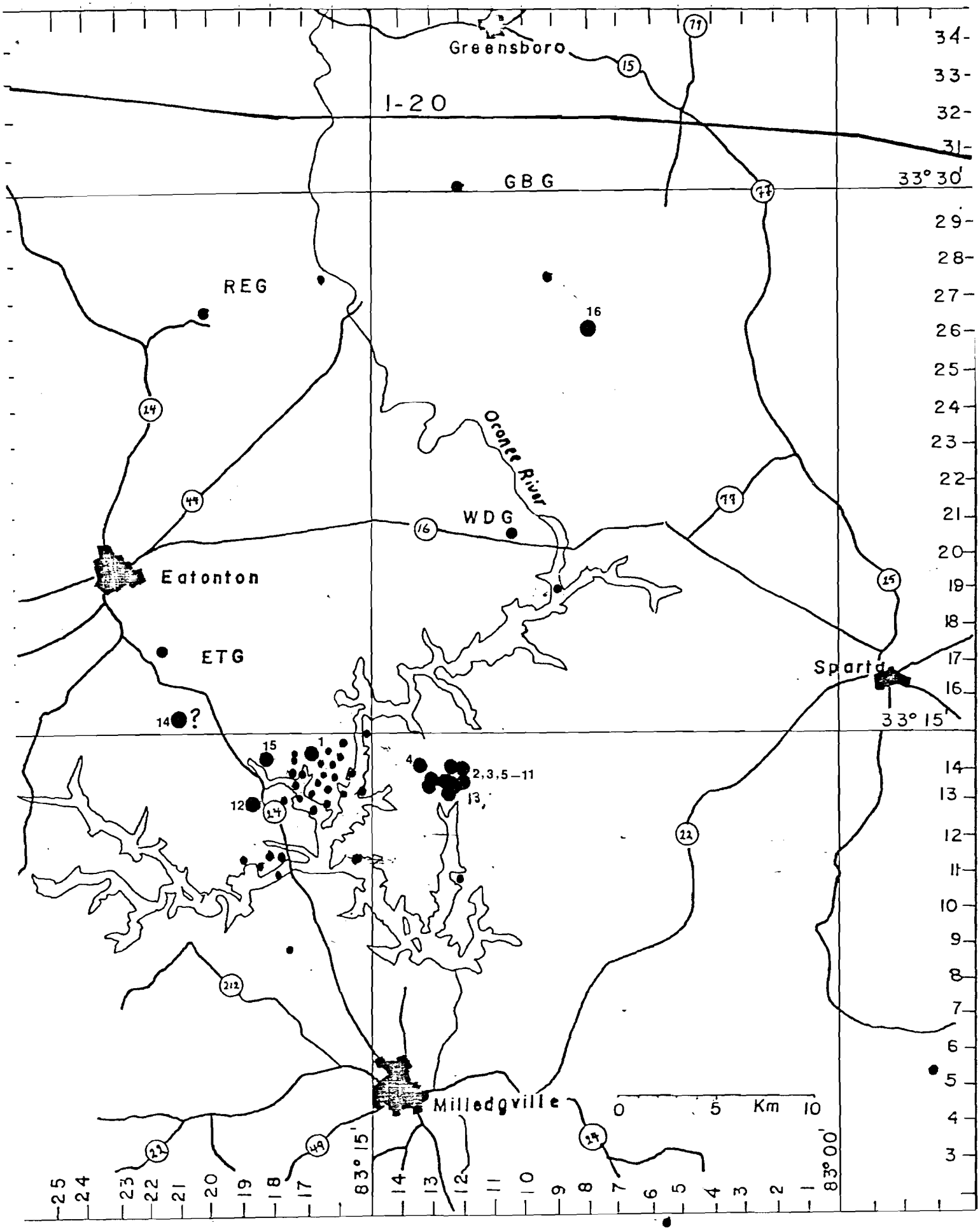
ocation No.	Date	STA	P-time	S.P.	Magnitude	Latitude	Longitude
*	6-17-1978	REG	15:20:52.00	1.450	0.0		
1	6-22-1978	ETG	12:36:44.200	1.00	0.2	33^{o} 14.45	83^{o} 16.89
		WDG	12:36:45.200	2.150			
2	6-25-1978	ETG	05:25:09.950	2.150	0.2	33^{o} 13.59	83^{o} 12.09
		GBG	05:25:12.250	3.780			
		WDG	05:25:09.650	2.050			
3	6-28-1978	ETG	22:41:12.100	2.100	0.0	33^{o} 14.16	83^{o} 12.16
		GBG	22:41:14.800	3.800			
4	6-30-1978	ETG	14:04:16.200	2.050	0.0	33^{o} 14.22	83^{o} 13.39
		GBG	14:04:19.550	3.550			
5	7-4-1978	ETG	10:49:33.40	2.100	0.7	33^{o} 13.60	83^{o} 12.25
		GBG	10:49:35.890	3.810			
		WDG	10:49:33.100	2.00			
6	7-4-1978	ETG	16:44:47.850	2.100	0.2	33^{o} 13.78	83^{o} 11.98
		GBG	16:44:50.0	3.775			
		WDG	16:44:47.50	2.00			
7	7-4-1978	ETG	18:24:33.950	2.100	0.1	33^{o} 13.53	83^{o} 13.13
		GBG	18:24:36.650	3.780			
		WDG	18:24:34.150	2.00			
*	7-9-1978	ETG	02:53:50.0	1.250	0.0		
8	7-9-1978	ETG	07:03:30.40	2.100	1.8	33^{o} 14.12	83^{o} 11.96
		GBG	07:03:33.00	3.850			
8	7-9-1978	ETG	07:11:56.950	2.100	0.0	33^{o} 14.12	83^{o} 11.96
8	7-9-1978	ETG	07:50:15.600	2.150	0.0	33^{o} 14.12	83^{o} 11.96
*	7-9-1978	ETG	17:47:14.400	1.200	0.0		
:	7-9-1978	ETG	19:03:41.70	1.250	0.0		
'	7-10-1978	ETG	03:09:28.250	2.100	0.75	33^{o} 13.38	83^{o} 12.50
		GBG	03:09:30.80	3.850			
		WDG	03:09:28.100	2.065			
	7-10-1978	ETG	05:41:00.50	2.100	0.0	33^{o} 13.38	83^{o} 12.50
		GBG	05:41:02.40	3.850			

Table II (Cont'd.)

cation No.	Date	STA	P-time	S.P.	Magnitude	Latitude	Longitude
9	7-10-1978	ETG	07:52:28.700	2.100	0.2	33° 13.38	83° 12.50
		GBG	07:52:31.100	3.845			
		WDG	07:52:28.50	2.060			
9	7-10-1978	ETG	09:24:18.650	2.100	0.0	33° 13.38	83° 12.50
		GBG	09:24:21.00	3.850			
		WDG	09:24:18.350	2.065			
10	7-11-1978	ETG	07:33:08.75	2.075	0.0	33° 13.73	83° 12.18
10	7-11-1978	ETG	08:43:44.50	2.0750	0.1	33° 13.73	83° 12.18
		GBG	08:43:46.80	3.810			
		WDG	08:43:44.20	1.975			
10	7-11-1978	ETG	09:09:17.25	2.070	0.0	33° 13.73	83° 12.18
		GBG	09:09:19.850	3.815			
		WDG	09:09:17.100				
10	7-11-1978	ETG	09:11:36.00	2.075	0.0	33° 13.73	83° 12.18
10	7-11-1978	ETG	10:02:24.750	2.115	0.0	33° 13.73	83° 12.18
10	7-11-1978	ETG	16:17:04.300	2.100	0.0	33° 13.73	83° 12.18
*	7-12-1978	WDG	05:47:17.125	1.450	0.0		
11	7-15-1978	ETG	21:47:44.45	2.125	0.0	33° 13.63	83° 12.40
		GBG	21:47:46.80	3.820			
		WDG	21:47:44.350	1.965			
*	7-22-1978	GBG	03:19:51.35	4.250	0.1		
*	7-22-1978	GBG	03:52:33:875	4.300	0.1		
*	7-28-1978	GBG	12:57:58.75	4.110	0.4		
*	7-28-1978	GBG	13:04:13.500	4.100	1.30		
*	7-28-1978	GBG	13:10:58.700	4.100	0.4		
12	8-3-1978	ETG	15:08:27.750	1.430	0.0	33° 12.95	83° 18.78
		GBG	15:08:32.40	4.150			
13	8-6-1978	ETG	01:47:27.750	2.100	0.0	33° 13.750	83° 12.76
		REG	01:47:29.800	3.220			
		WDG	01:47:27.400	2.00			
14	8-22-1978	GBG	10:29:46.350	2.500	0.1	33° 15.34	83° 21.17
		REG	10:29:44.800	2.650			
		WDG	10:29:44.350	--	questionable location		

Table II (Cont'd.)

ation No.	Date	STA	P-time	S.P.	Magnitude	Latitude	Longitude
*	8-22-1978	GBG	19:51:16.70	2.100	0.1		
15	8-26-1978	GBG	16:02:46.150	4.050	0.15	33^{o} 14.34	83^{o} 18.07
	,	REG	16:02:45.100	2.956			
		WDG	16:02:43.720	2.500			
16	8-20-1978	ETG	17:20:34.450	3.780	0.2	33^{o} 26.29	83^{o} 07.82
		GBG	17:20:31.80	1.280	(probably Quarry)		
		REG	17:20:33.480	2.350			


Greensboro
I-20
GBG
REG
16
Oconee River
WDG
Eatonton
ETG
14 ?
15
1
4
2,3,5–11
13
12
Sparta
33° 30'
33° 15'
Milledgville
0 5 Km 10
83° 15'
83° 00'

G-35-653

GEORGIA INSTITUTE OF TECHNOLOGY
SCHOOL OF GEOPHYSICAL SCIENCES
Atlanta, Georgia 30332
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December 12, 1978

Mr. R. C. Thrasher
Georgia Power Company
P. O. Box 4545
Atlanta, Georgia 30302

Subject: Quarterly Letter Report Number 9, covering the period of 1 September to 30 November 1978

Re: Seismic monitoring near Wallace Dam, Georgia

Dear Sir:

The total cumulative percentage recording coverage for the Wallace Dam net for the period September 1st to November 31st, 1978 was 99.52%. This corresponds to a cumulative percentage of 98.82% for September, 100% for October and 99.72% for November. The lost time was due to telephone communication system failures and recording equipment problems.

During this reporting period, more than 25 regional earthquakes and teleseisms were recorded; the most significant of these are tabulated in Table I.

Numerous quarry blasts were detected during this report period, but these were not tabulated. They were identified by their characteristics phases, time of day, and location.

Seismic activity for the period of this report in the Lake Sinclair-Wallace Dam area is tabulated in Table II.

The enclosed map shows the distribution of seismic activity around the Lake Sinclair area. The total number of events during this reporting period has fallen markedly from last quarter's number. However, the quietest months appear to have been September and October with a general increase in the monthly total for November. A significant change in the activity is the occurrence of events in the area near $33^{o}16'$, $83^{o}16'$, a quiet area during the last quarter. Also noteworthy is the October 2 event (m_b=2.0) at Location number 2. The October 2 event is the first event to be located at this site.

One event was located near the Wallace Dam (Location number 1). The September 7, 1978 event occurred within 5 km of the Wallace Dam site and is the second event to be located in that general area.

Construction near the dam has necessitated the temporary removal of station WDG. This station will be replaced as soon as we are able to determine the optimum location not in the way of further construction.

Recommendations for a continuation of Monitoring

The current contract for monitoring seismic activity in the vicinity of Wallace Dam expires in July 1979. On the basis of observations of seismic activity with the Wallace Dam net and seismic activity near reservoirs in the Piedmont Province, a two year extension of seismic monitoring is recommended. The extension is recommended because the probability is high that seismic activity may be induced in the vicinity of Wallace Dam and the data pertaining to the location of active areas and eventual defusion of the activity with time will be essential for the planning of future projects in the reservoir area.

The two year time duration of the recommended extension is designed to cover the expected time period of possible occurrance of directly induced seismic activity. While the timing for the seismic activity varies significantly among reservoirs and while most less than 100 meters deep do not directly induce seismic activity, those that are directly associated with seismic activity show a peak in activity level during or within a year of filling. The peak in activity at Jocassee occurred in January 1976 approximately two years after filling was complete in November 1973. Events were felt in October 1975, three months before the activity peak, but a microearthquake net or survey might have detected events much earlier. The two year extension would allow detection of seismic activity even if delayed as long as the two years observed at Jocassee.

If seismic activity is induced near Wallace Dam, the earthquakes will most likely be small, generally unfelt and less than magnitude 2.5. Magnitudes as large as 3.5 are not common (only one magnitude 3.2 occurred at Jocassee) and magnitudes larger than 4.5 are highly unlikely.

The end of the period of directly induced seismic activity, if like other reservoirs, will be marked by a gradual decay in the level of activity and a dispersion of the epicenters. The two year extension should be sufficient to identify this phase if the peak activity is not delayed significantly.

The estimate of a high probability that some seismic activity will be induced when the reservoir is filled is based on four observations. First, two events have occurred less than 5 km southeast of Wallace Dam and one questionable event occurred within the reservoir area. Hence, there is evidence (however weak) of seismic activity within the area of influence of the reservoir. Second, swarms of low-magnitude events at more than three general areas were located near Lake Sinclair. Swarm type activity is typified by an abnormally large number of low-magnitude events relative to larger events and the lack of a single dominant event. This type of activity is often observed in areas where seismic activity has been influenced by the presence of a reservoir. Third, some of the historical earthquakes in the area are located to the north and east of the Lake Sinclair area and could be in areas within tne

Wallace Dam reservoir area. Fourth, the new reservoir is located in the central portion of the Piedmont Province. The Montecello reservoir in South Carolina which has recently induced seismic activity is in the same relative position in the central portion of the Piedmont Province.

If you have any further questions concerning this report or the reccommendations please feel free to contact us directly.

Respectfully submitted,

Leland T. Long
Associate Professor

LTL/dp

TABLE I

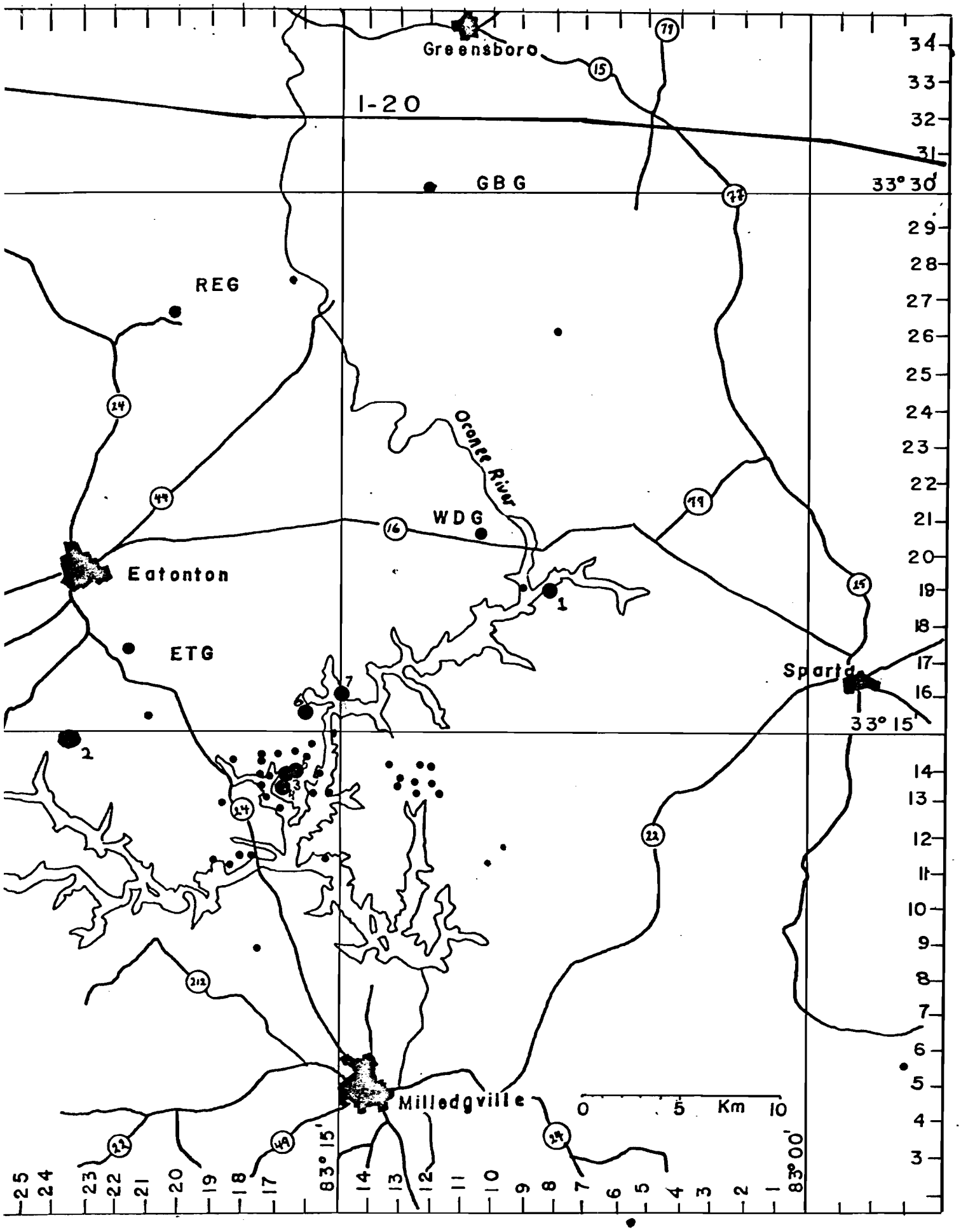
Regional Seismicity

Date	Time	m_b Duration	Location
SEP 7 1978	22:20	1.9	Summerville, S.C.
SEP 7 1978	22:54	2.1	Summerville, S.C.
SEP 21 1978	07:08	1.9	JSC Station Area, S.C.
OCT 1 1978	12:25	1.0	JSC Station Area, S.C.
OCT 3 1978	09:39	1.5	JSC Station Area, S.C.
OCT 7 1978	20:02	0.7	CHRA, Ga. - S.C.
OCT 27 1978	07:26	2.0	JSC Station Area, S.C.
NOV 6 1978	23:05		Lake City, Fla. ?
NOV 23 1978	01:52	1.7	JSC Station Area, S.C.
NOV 24 1978	11:55	1.0	JSC Station Area, S.C.
NOV 29 1978	17:57		S. W. Mexico

TABLE II

Seismic Activity in Lake Sinclair - Wallace Dam Area

Location No.	Date	STA	P-Time	S-P	m_b Duration	Latitude	Longitude
1	SEP 7 1978	ETG	00:53:37.53	2.69	0.0	33°18.89'	83°8.14'
		GBG	00:53:38.00	2.50			
		REG	00:53:37.97	2.80			
		WDG	00:53:36.63	1.38?			
2	OCT 2 1978	ETG	00:24:59.20	1.53	2.0	33°14.72'	83°23.74'
		GBG	00:25:03.68	4.20			
		REG	00:25:02.09	3.04			
		WDG	00:25:01.91	3.32			
3	OCT 3 1978	ETG	22:42:05.30	1.50	0.8	33°13.89'	83°16.45'
		GBG	22:42:08.65	3.80			
		REG	22:42:07.63	3.06			
		WDG	22:42:06.29	2.50			
*	OCT 4 1978	ETG	20:25:26.83	0.38	0.0		
*	NOV 2 1978	ETG	07:47:20.20	1.3	0.0		
4	NOV 13 1978	ETG	04:49:03.52	1.40	0.0	33°13.43'	83°16.63'
		GBG	04:49:06.97	3.90			
		REG	04:49:05.97	3.50			
		WDG	04:49:04.62	2.45			
*	NOV 14 1978	GBG	18:13:34.24	0.35	0.0		
5	NOV 17 1978	ETG	10:01:53.50	1.30	0.0	33°13.93'	83°16.33'
		GBG	10:01:57.20	4.00			
		REG	10:01:55.97	3.25			
*	NOV 22 1978	ETG	21:06:27.86	1.0	0.0		
6	NOV 24 1978	ETG	09:39:17.40	1.19	0.0	33°15.46'	83°16.07'
		REG	09:39:19.79	2.82			
7	NOV 24 1978	ETG	09:51:33.05	1.20	0.1	33°16.03'	83°15.47'
		REG	09:51:35.15	2.78			
*	NOV 27 1978	ETG	23:01:00.9	1.95	0.0		
*	NOV 27 1978	ETG	23:25:29.75	1.13	0.0		


Greensboro
I-20
GBG
REG
Oconee River
WDG
Eatonton
ETG
Sparta
Milledgville
0 5 Km 10
33° 30'
33° 15'
83° 15'
83° 00'

G-35-653

GEORGIA INSTITUTE OF TECHNOLOGY

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March 12, 1979

Mr. C. R. Thrasher
Georgia Power Company
P. O. Box 4545
Atlanta, Georgia 30302

Subject: Quarterly Letter Report Number 10, covering the period of 1 December 1978 to 28 February 1979.

Re: Seismic Monitoring near Wallace Dam, Georgia

Dear Sir:

The total cumulative percent coverage for the Wallace Dam net for the period December 1, 1978 to February 28, 1979 was 99.42%. This corresponds to a cumulative percent coverage of 99.66% for December, 100% for January, and 98.50% for February. The lost time was due to telephone communication system failures.

During this reporting period, instruments in the Wallace Dam net recorded several regional events. The most significant of those are tabulated in Table I.

Seismic activity for this reporting period in the Lake Sinclair-Wallace Dam area is tabulated in Table II. Beginning with this report and for all subsequent reports, the listing of local events will be handled by computer. A special computer file has been established for the Wallace Dam project in which all local events will be stored. Thus, Table II in this report is the computer printed list from that file. In reading Table II, please note the following facts:

1. The events are listed in chronological order. The I. D. number associated with each event is for computer reference purposes and these do not follow chronological order. I.D. numbers are used on accompanying map.

2. In order to add an event to the computer file, it is necessary to enter a latitude and longitude. Thus, events that were recorded at one station only were assigned a localtion of 33.0000 latitude and 83.0000 longitude but could not actually be located. These numbers are used then to indicate a local event, specific location unknown.

3. A slash "/" in the magnitude column indicates magnitude was not computed and was less than 0.0.

4. A "C" following the depth listing indicates depth held constant at that level in all computations.

We believe that the new computer filing system for storing and reporting events will make our job easier should seismic activity in the area increase in the future.

During the reporting period, no microearthquakes were identified in the Wallace Dam area.

Respectfully submitted,

Leland T. Long
Associate Professor

LTL/dp

Table I

Regional Seismicity

Date	Time	Location
12/14/78	11:13	South of Spartanburg, S.C.
1/8/79	01:05	Lake Keowee, S.C. Area
1/8/79	01:24	Lake Keowee, S.C. Area
1/19/79	08:56	Near Seneca, S.C.
2/1/79	01:26	N. W. of Lake Keowee, S.C.
2/16/79	14:37	South of Spartanburg, S.C.
2/20/79	23:21	South of Spartanburg, S.C.

All events in Table I are less than magnitude 3.0. No attempts were made to compute locations and locations in the table are estimated from Georgia stations and verbal reports of activity.

Table II

ID NO.	DATE	ORIGIN TIME	LATITUDE	LONGITUDE	DEPTH	MAGNITUDE
	LAKE OCONEE EVENT?					
4	78/12/15	22:06: 5.70	33.0000	83.0000	1.00C /	
	GBG	PG	22:06: 5.700	+/-	.100	
	LAKE SINCLAIR EVENT 1					
2	78/12/22	23:20:49.33	33.2612	83.2792	1.00C 0.5	
	ETG	PG	23:20: 50.900	+/-	.100	
	ETG	S-P	00:00: .750	+/-	.100	
	GBG	PG	23:20: 54.200	+/-	.100	
	GBG	S-P	00:00: 3.750	+/-	.100	
	REG	PG	23:20: 53.000	+/-	.100	
	REG	S-P	00:00: 2.900	+/-	.100	
	LAKE SINCLAIR EVENT 2					
3	79/01/10	18:09:18.25	33.2661	83.2290	1.00C 0.0	
	ETG	PG	18:09: 20.300	+/-	.100	
	ETG	S-P	00:00: 1.600	+/-	.100	
	GBG	PG	18:09: 23.000	+/-	.100	
	GBG	S-P	00:00: 3.300	+/-	.100	
	REG	PG	18:09: 22.300	+/-	.100	
	REG	S-P	00:00: 3.000	+/-	.100	
	LAKE SINCLAIR EVENT 3					
5	79/01/11	03:38:50.26	33.2602	83.2283	1.00C 0.0	
	ETG	PG	03:38: 52.500	+/-	.100	
	ETG	S-P	00:00: 1.500	+/-	.100	
	REG	PG	03:38: 54.300	+/-	.100	
	REG	S-P	00:00: 3.100	+/-	.100	
	LAKE SINCLAIR EVENT 4					
6	79/01/11	03:53:58.00	33.0000	83.0000	1.00C /	
	ETG	PG	03:38: 58.000	+/-	.100	
	ETG	S-P	00:00: 1.250	+/-	.100	
	LAKE SINCLAIR EVENT 5					
7	79/01/11	17:16:38.00	33.0000	83.0000	1.00C /	
	ETG	PG	17:16: 38.000	+/-	.100	
	ETG	S-P	00:00: .550	+/-	.100	
	LAKE SINCLAIR EVENT 5A					
25	79/01/14	22:41:27.86	33.2536	83.1896	1.00C 0.0	
	ETG	PG	22:41: 30.910	+/-	.100	
	ETG	S-P	00:00: 1.830	+/-	.100	
	REG	PG	22:41: 32.150	+/-	.100	
	REG	S-P	00:00: 3.630	+/-	.100	
	WDG	PG	22:41: 30.680	+/-	.100	
	WDG	S-P	00:00: 2.000	+/-	.100	

LAKE SINCLAIR EVENT 6

8 79/01/16 19:38:57.00 33.0000 83.0000 1.00C /

ETG	PG	19:38: 57.000	+/-	.100	
ETG	S-P	00:00: .500	+/-	.100	

LAKE SINCLAIR EVENT 7

9 79/01/18 09:44:52.50 33.0000 83.0000 1.00C /

ETG	PG	09:44: 52.500	+/-	.100	

LAKE SINCLAIR EVENT 8

10 79/01/18 09:45:12.10 33.0000 83.0000 1.00C /

ETG	PG	09:45: 12.100	+/-	.100	

LAKE SINCLAIR EVENT 9

11 79/01/27 23:04: 4.50 33.0000 83.0000 1.00C /

ETG	PG	23:04: 4.400	+/-	.100	
ETG	S-P	00:00: 1.500	+/-	.100	

LAKE SINCLAIR EVENT 10

12 79/02/07 23:44: 8.40 33.0000 83.0000 1.00C /

ETG	PG	23:44: 8.400	+/-	.100	
ETG	S-P	00:00: 3.300	+/-	.100	

LAKE OCONEE EVENT?

13 79/02/08 16:06:36.40 33.0000 83.0000 1.00C /

WDG	PG	16:06: 36.400	+/-	.100	
WDG	S-P	00:00: .600	+/-	.100	

LAKE SINCLAIR EVENT 11 ?

14 79/02/08 23:01: 6.20 33.0000 83.0000 1.00C /

ETG	PG	23:01: 6.200	+/-	.100	
REG	S-P	00:00: 3.100	+/-	.100	

LAKE SINCLAIR EVENT 12

24 79/02/11 16:29: 9.23 33.2530 83.1911 1.00C 0.0

ETG	PG	16:29: 11.850	+/-	.100	
ETG	S-P	00:00: 2.250	+/-	.100	
GBG	PG	16:29: 14.500	+/-	.100	
GBG	S-P	00:00: 3.710	+/-	.100	
REG	PG	16:29: 13.950	+/-	.100	
REG	S-P	00:00: 3.130	+/-	.100	
WDG	PG	16:29: 11.760	+/-	.100	
WDG	S-P	00:00: 1.930	+/-	.100	

LAKE SINCLAIR EVENT 13 ?

15 79/02/14 19:26:45.20 33.0000 83.0000 1.00C /

REG	PG	19:26: 45.200	+/-	.100	

LAKE SINCLAIR EVENT 14 ?

16 79/02/14 19:27:15.30 33.0000 83.0000 1.00C /

REG	PG	19:27: 15.300	+/-	.100	

LAKE SINCLAIR EVENT 15 ?

17 79/02/14 19:27:44.90 33.0000 83.0000 1.00C /

REG	PG	19:27: 44.900	+/-	.100	

LAKE SINCLAIR EVENT 16 ?

18 79/02/15 11:51:36.20 33.0000 83.0000 1.00C /

GBG	PG	11:51: 36.200	+/-	.100	

LAKE SINCLAIR EVENT 17 ?

19 79/02/15 11:51:42.90 33.0000 83.0000 1.00C /
GBG PG 11:51: 42.900 +/- .100

LAKE SINCLAIR EVENT 18 ?

20 79/02/19 22:07:44.80 33.0000 83.0000 1.00C /
ETG PG 22:07: 44.800 +/- .100

LAKE OCONEE EVENT ?

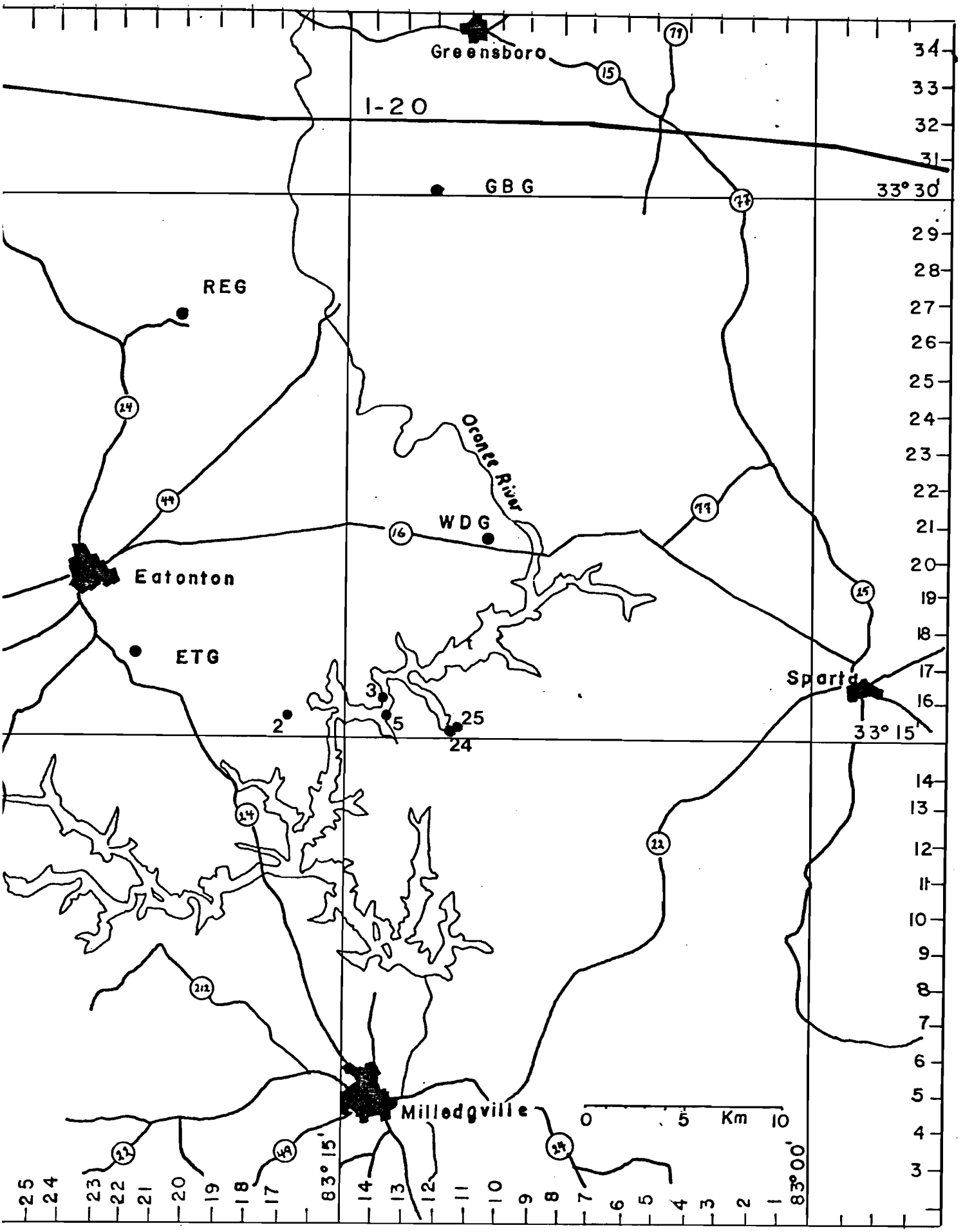
21 79/02/22 15:37:30.50 33.0000 83.0000 1.00C /
GBG PG 15:37: 30.500 +/- .100

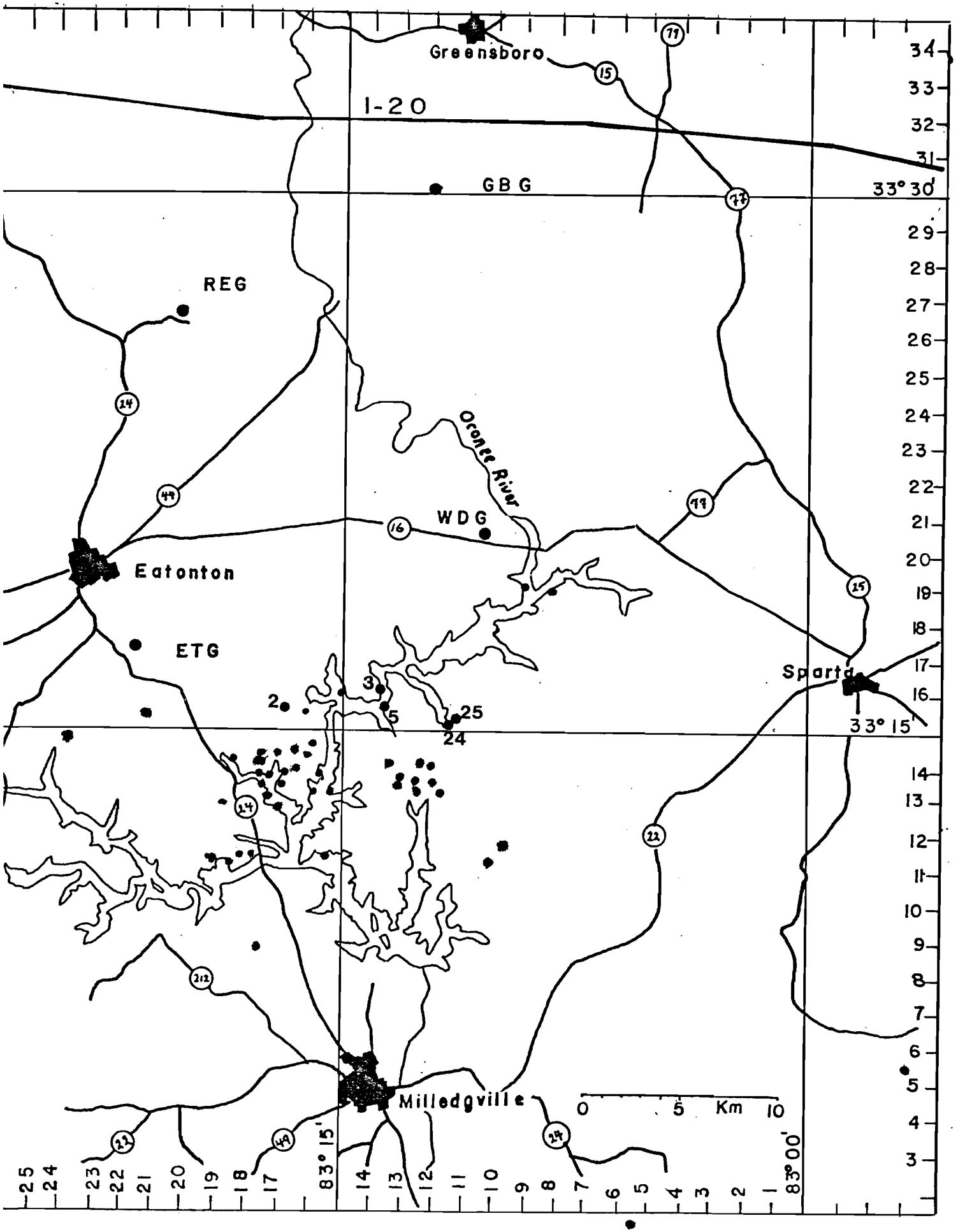
LAKE SINCLAIR EVENT 19 ?

22 79/02/27 22:25:34.00 33.0000 83.0000 1.00C /
ETG PG 22:25: 34.000 +/- .100

LAKE SINCLAIR EVENT 20 ?

23 79/02/28 17:49:26.50 33.0000 83.0000 1.00C /
ETG PG 17:49: 26.500 +/- .100


Greensboro
I-20
GBG
33° 30'
REG
Oconee River
WDG
Eatonton
ETG
Sparta
33° 15'
Milledgville
0 5 Km 10
83° 15'
83° 00'


Greensboro
I-20
GBG
REG
Eatonton
ETG
WDG
Oconee River
Sparta
Milledgville
33° 30'
33° 15'
83° 15'
83° 00'
0 5 Km 10

G-35-653

GEORGIA INSTITUTE OF TECHNOLOGY
SCHOOL OF GEOPHYSICAL SCIENCES
Atlanta, Georgia 30332
(404) 894-2857

June 11, 1979

Mr. C. R. Thrasher
Georgia Power Company
P. O. Box 4545
Atlanta, Georgia 30302

Subject: Quarterly Letter Report Number 11, covering the period of 1 March 1979 to 31 May 1979.

Re: Seismic Monitoring near Wallace Dam, Georgia

Dear Sir:

The total cumulative percent coverage for the Wallace Dam net for the period March 1, 1979 to May 31, 1979 was 99.86% corresponding to a cumulative percent coverage of 100% for March, 99.58% for April, and 100% for May. The lost time was due to telephone communication system failures.

During this reporting period, instruments in the Wallace Dam net recorded several regional events and major earthquakes. The most significant of these are tabulated in Table I.

Seismic activity for this reporting period for the Lake Oconee and Lake Sinclair areas is tabulated in Table II. Note that an asterisk (*) in the magnitude column indicates magnitude not computed but was less than 0.0. Also note that a location of 33.0000 degrees latitude, 83.0000 degrees longitude indicates specific location not computable. Because of the loading of Lake Oconee during the quarter all signatures that could possibly be interpreted as events were listed. Hence, table II contains some questionable events identified at only one station and some of these events may only be noise. They are being listed for future reference should events large enough to confirm their identity occur in the future.

Seismic activity has continued at a rather low level much like during the last quarter. Only one locatable event occurred during the quarter. It was located in the Lake Sinclair area. This event is shown on the first map and it is also plotted on the cumulative event map which follows.

TABLE I

Regional Seismicity

Date	Location
March 7, 1979	near Maryville, Tennessee
March 14, 1979	near Mexico City, Mexico*
March 20, 1979	near JSC area South Carolina
March 23, 1979	near Mexico City, Mexico*
May 4, 1979	Near Greenwood, South Carolina

*major earthquakes

Since January 20, 1979 we have been preparing bi-weekly plots of pool elevations versus seismic activity for the Lake Oconee and Lake Sinclair reservoir areas. A cumulative plot of this data from January 20 to May 31, 1979 for each of these areas is submitted with this report. Future quarterly reports will include similar plots for the period which the report covers.

The events listed for the Lake Oconee area (and all except the one locatable event in the Lake Sinclair area) are suffixed with a question mark (?) in Table II to indicate that the seismic signature was recorded at one station only. It is therefore not to be presumed that these are definitely microearthquakes. No definite microearthquakes were identified in the Lake Oconee area during the reporting period.

Respectfully submitted,

Leland T. Long
Associate Professor

LTL/dp

TABLE II

ID NO.	DATE	ORIGIN TIME	LATITUDE	LONGITUDE	DEPTH	MAGNITUDE
	LAKE OCONEE EVENT ?					
3	79/03/02	11:40:39.68C	33.0000	83.0000	0.00C	*
	GBG PG	11:40: 39.680		+/-	.100	
	GBG S-P	00:00: .010		+/-	.100	
	LAKE OCONEE EVENT ?					
4	79/03/02	11:40:46.50C	33.0000	83.0000	0.00C	*
	GBG PG	11:40: 46.500		+/-	.100	
	GBG S-P	00:00: .200		+/-	.100	
	LAKE SINCLAIR EVENT ?					
5	79/03/05	17:39: 3.00C	33.0000	83.0000	0.00C	*
	ETG PG	17:39: 3.000		+/-	.100	
	ETG S-P	00:00: .010		+/-	.100	
	LAKE SINCLAIR EVENT ?					
6	79/03/15	23:09:26.20C	33.0000	83.0000	0.00C	*
	ETG PG	23:09: 26.200		+/-	.100	
	ETG S-P	00:00: 1.000		+/-	.100	
	LAKE OCONEE EVENT ?					
7	79/03/16	05:12:15.70C	33.0000	83.0000	0.00C	*
	REG PG	05:12: 15.700		+/-	.100	
	REG S-P	00:00: .010		+/-	.100	
	LAKE OCONEE EVENT ?					
8	79/03/16	19:53:19.10C	33.0000	83.0000	0.00C	*
	GBG PG	19:53: 19.100		+/-	.100	
	GBG S-P	00:00: .010		+/-	.100	
	LAKE SINCLAIR EVENT ?					
9	79/03/16	20:15:21.20C	33.0000	83.0000	0.00C	*
	ETG PG	20:15: 21.200		+/-	.100	
	ETG S-P	00:00: 1.000		+/-	.100	
	LAKE OCONEE EVENT ?					
11	79/03/27	20:04:16.38C	33.0000	83.0000	0.00C	*
	REG PG	20:04: 16.380		+/-	.100	
	REG S-P	00:00: .100		+/-	.100	

LAKE SINCLAIR EVENT

2	79/03/28	11:07:59.37		33.2372		83.2586	1.00C	.03
	ETG	PG	11:08:	1.200		+/-	.010	
	ETG	S-P	00:00:	1.440		+/-	.100	
	GBG	PG	11:08:	4.880		+/-	.010	
	GBG	S-P	00:00:	4.020		+/-	.010	
	REG	PG	11:08:	3.750		+/-	.010	
	REG	S-P	00:00:	3.180		+/-	.010	
	WDG	PG	11:08:	2.650		+/-	.010	
	WDG	S-P	00:00:	2.300		+/-	.010	

LAKE OCONEE EVENT ?

12	79/04/09	14:33:43.70C		33.0000		83.0000	0.00C	*
	WDG	PG	14:33:	43.700		+/-	.100	
	WDG	S-P	00:00:	.100		+/-	.100	

LAKE SINCLAIR EVENT ?

13	79/04/10	13:00:57.50C		33.0000		83.0000	0.00C	*
	ETG	PG	13:00:	57.500		+/-	.100	
	ETG	S-P	00:00:	.100		+/-	.100	

LAKE OCONEE EVENT ?

14	79/04/20	20:26:47.10C		33.0000		83.0000	0.00C	*
	GBG	PG	20:26:	47.100		+/-	.100	
	GBG	S-P	00:00:	.100		+/-	.100	

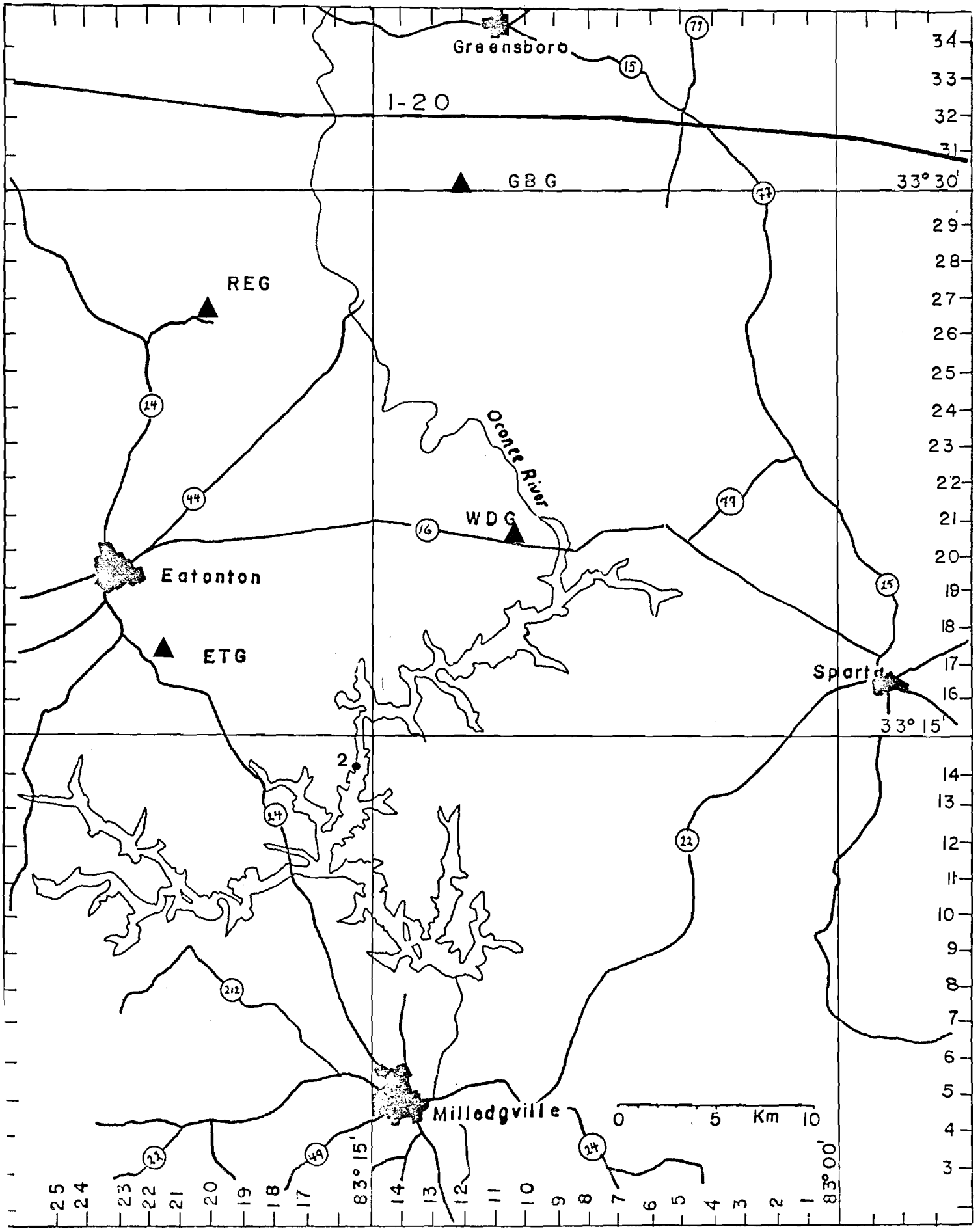
LAKE OCONEE EVENT ?

15	79/04/30	19:33:28.40C		33.0000		83.0000	0.00C	*
	REG	PG	19:33:	28.400		+/-	.100	
	REG	S-P	00:00:	.100		+/-	.100	

(?) INDICATES UNCERTAINTY FACTOR TOO HIGH TO REGARD AS A DEFINITE EVENT (ONE STATION SIGNATURE ONLY)

(*) INDICATES MAGNITUDE NOT COMPUTED

33.0000 LAT. 83.0000 LONG. INDICATE A NON-LOCATABLE EVENT (EXACT LOCATION UNKNOWN)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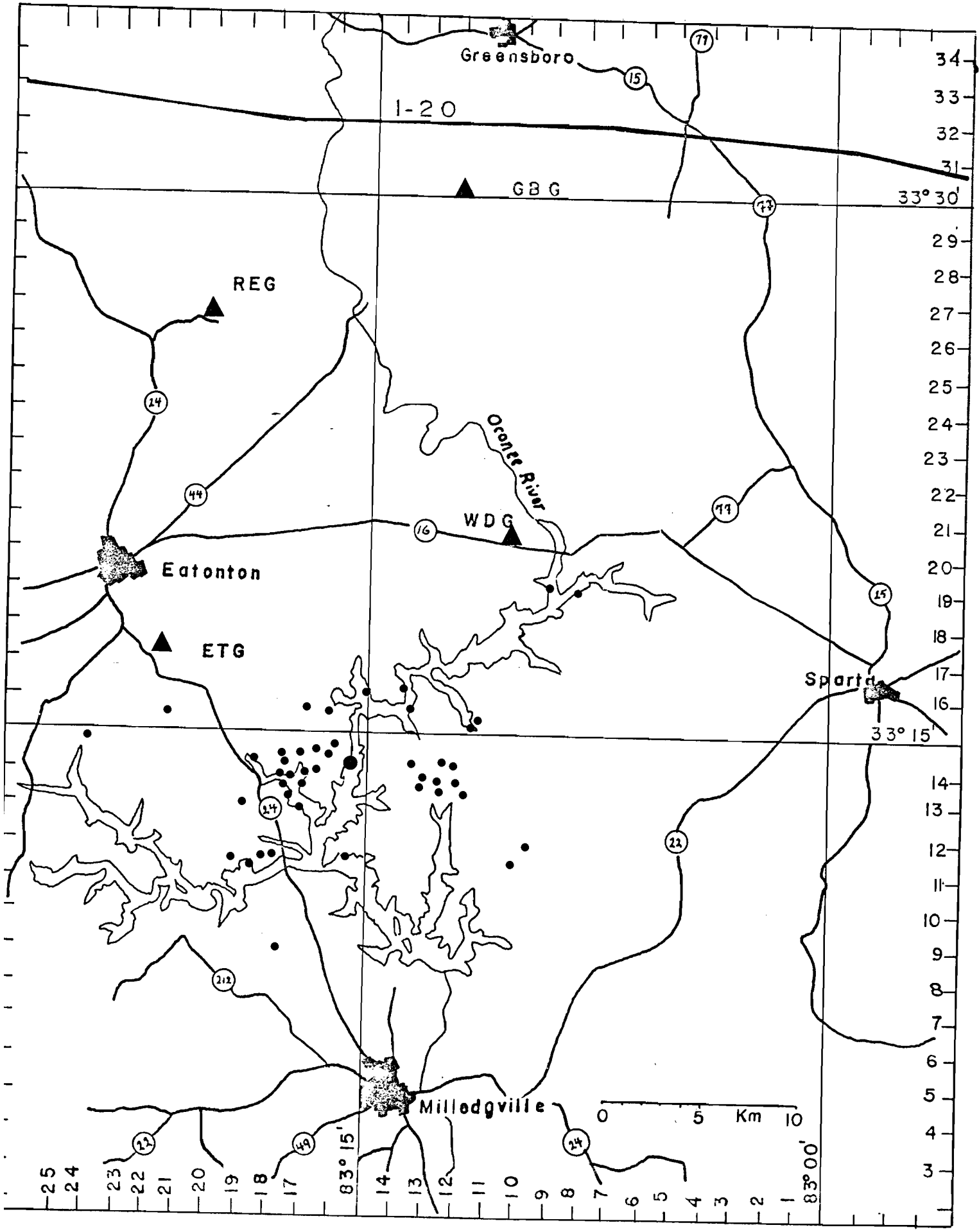
GBG
33° 30'
REG
Oconee River
WDG
Eatonton
ETG
Sparta
33° 15'
2
Milledgville
0 5 Km 10
83° 15'
83° 00'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I-20
GBG
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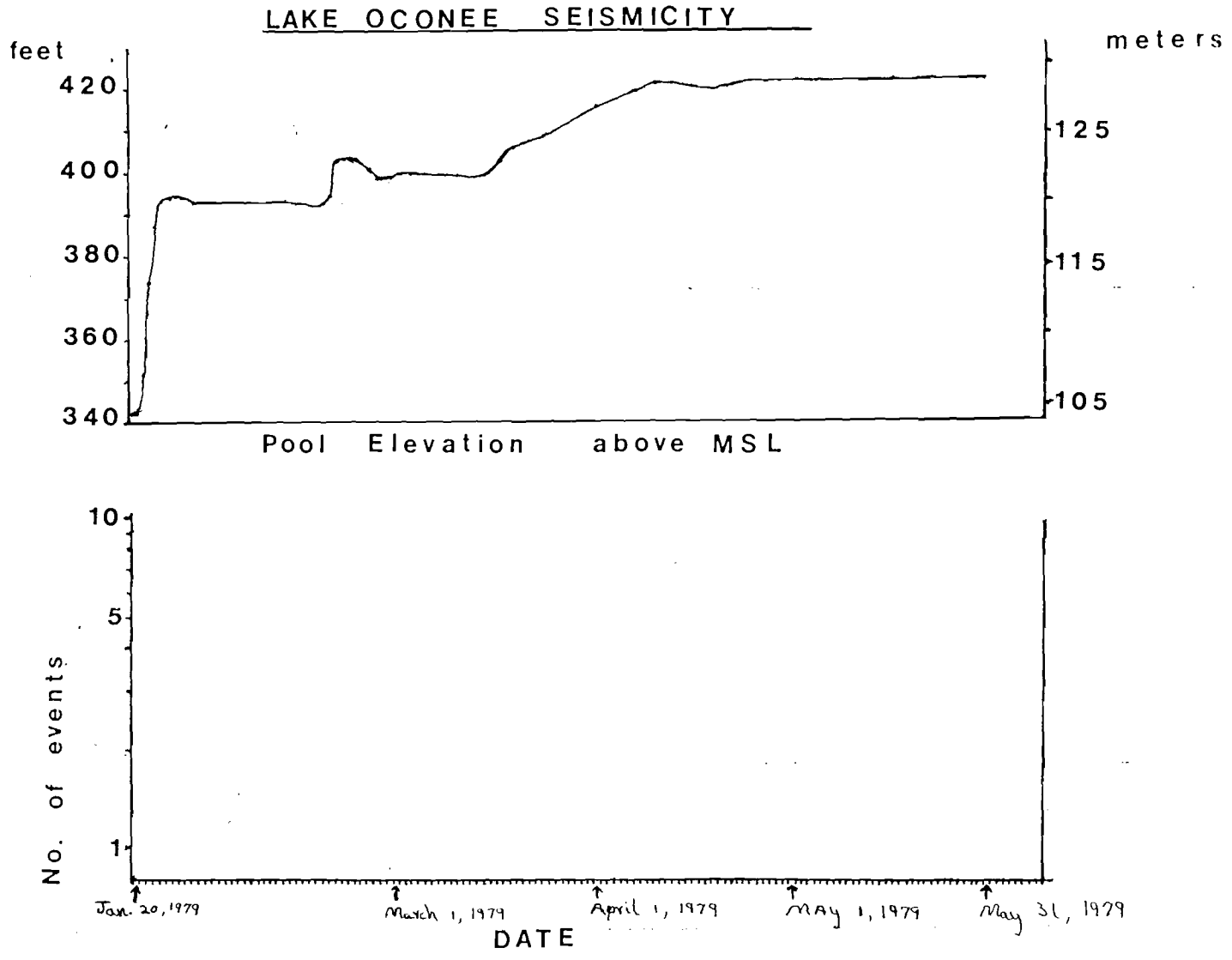
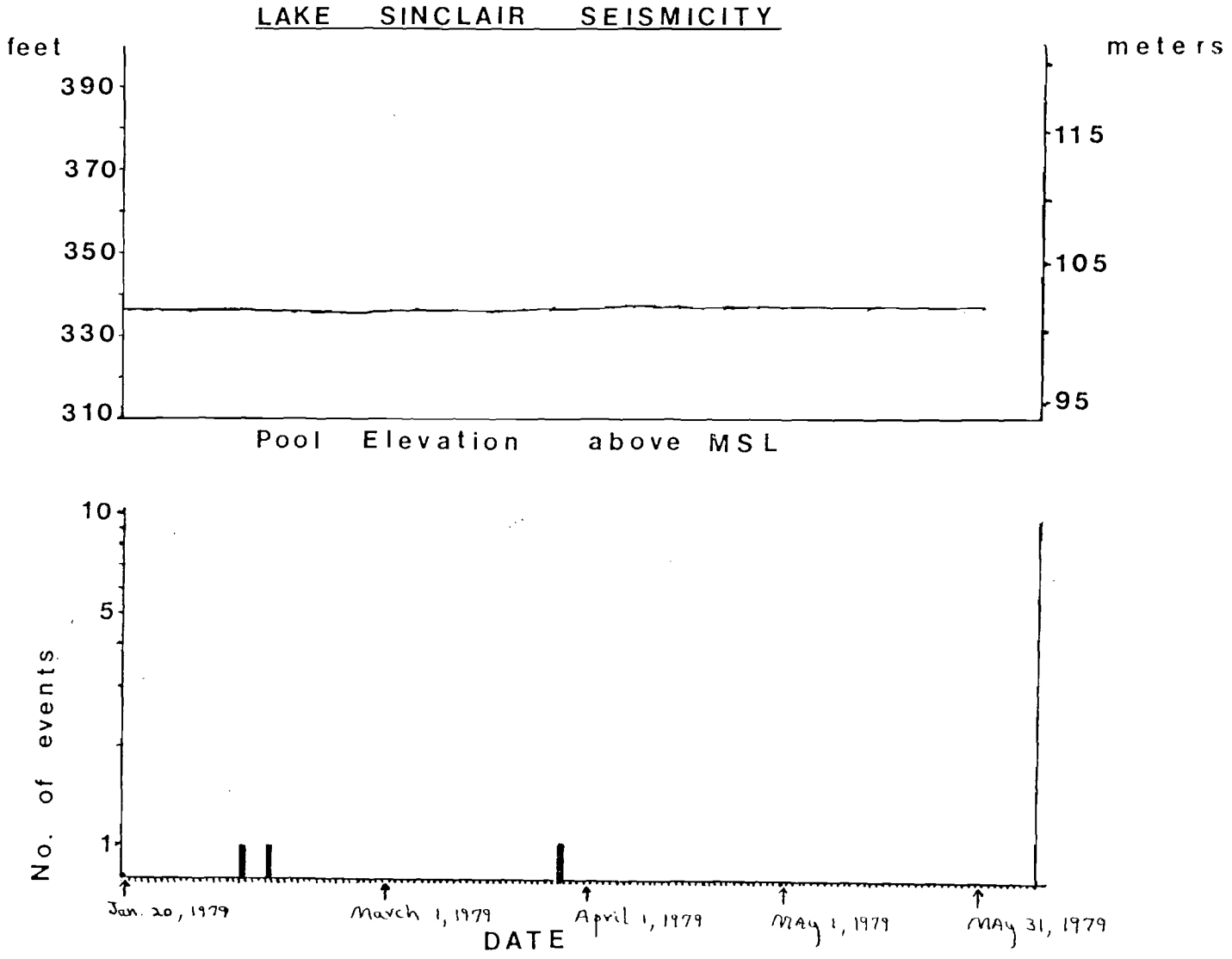
83° 15'
83° 00'


LAKE OCONEE SEISMICITY
feet
420
400
380
360
340
meters
125
115
105
Pool Elevation above MSL
10
5
1
No. of events
Jan. 20, 1979
March 1, 1979
April 1, 1979
MAY 1, 1979
May 31, 1979
DATE


LAKE SINCLAIR SEISMICITY
feet
meters
390
370
350
330
310
115
105
95
Pool Elevation above MSL
10
5
1
No. of events
Jan. 20, 1979
March 1, 1979
April 1, 1979
May 1, 1979
May 31, 1979
DATE

G- 55-65.

GEORGIA INSTITUTE OF TECHNOLOGY
SCHOOL OF GEOPHYSICAL SCIENCES
Atlanta, Georgia 30332
(404) 894-2857

September 6, 1979

Mr. R. C. Thrasher
Georgia Power Company
P. O. Box 4545
Atlanta, Georgia 30302

Subject: Quarterly Letter Report Number 12, covering the period of 1 June to 31 August 1979.

Re: Seismic monitoring near Wallace Dam, Georgia

Dear Sir:

The total cumulative percentage recording coverage for the Wallace Dam net for the period June 1, 1979 to August 31, 1979 was 99.91%. This corresponds to a cumulative percentage of 100% for June, 100% for July and 99.73% for August. The lost time was due to telephone communication system failures.

During this reporting period, many regional earthquakes and teleseisms were recorded; the most significant of these are tabulated in Table I.

Seismic activity for the period of this report in the Lake Sinclair-Lake Oconee area is tabulated in Table II. The areal distribution of these events is shown on the accompanying map. As can be seen from the map, microearthquakes continue to occur in the Lake Sinclair area. One tentative microearthquake occurred between the two reservoirs somewhat closer to Oconee than to Sinclair. It cannot be determined at this time whether this event can be directly attributed to the filling of the Wallace Dam reservoir. It is possible that this was a blast in hard rock in an unidentified construction area, however it does have the character of an earthquake. We will be watching this area closely for further seismic activity.

Water level versus seismic activity plots are included with this report for both Lake Oconee and Lake Sinclair.

Recently, blasts large enough to be recorded at all four stations have been occurring frequently at Wallace Dam. We are presently analyzing the time-distance data obtained from these blasts in order to refine the travel-time curve used for locating earthquakes in the area.

Work is progressing on the new three-component system that will soon be deployed at the Wallace Dam site. We are in the process of assembling the equipment for the system which will be ready for installation about October 1, 1979.

If you have any questions concerning this report, please feel free to contact us directly.

Respectfully submitted,

Leland T. Long
Associate Professor

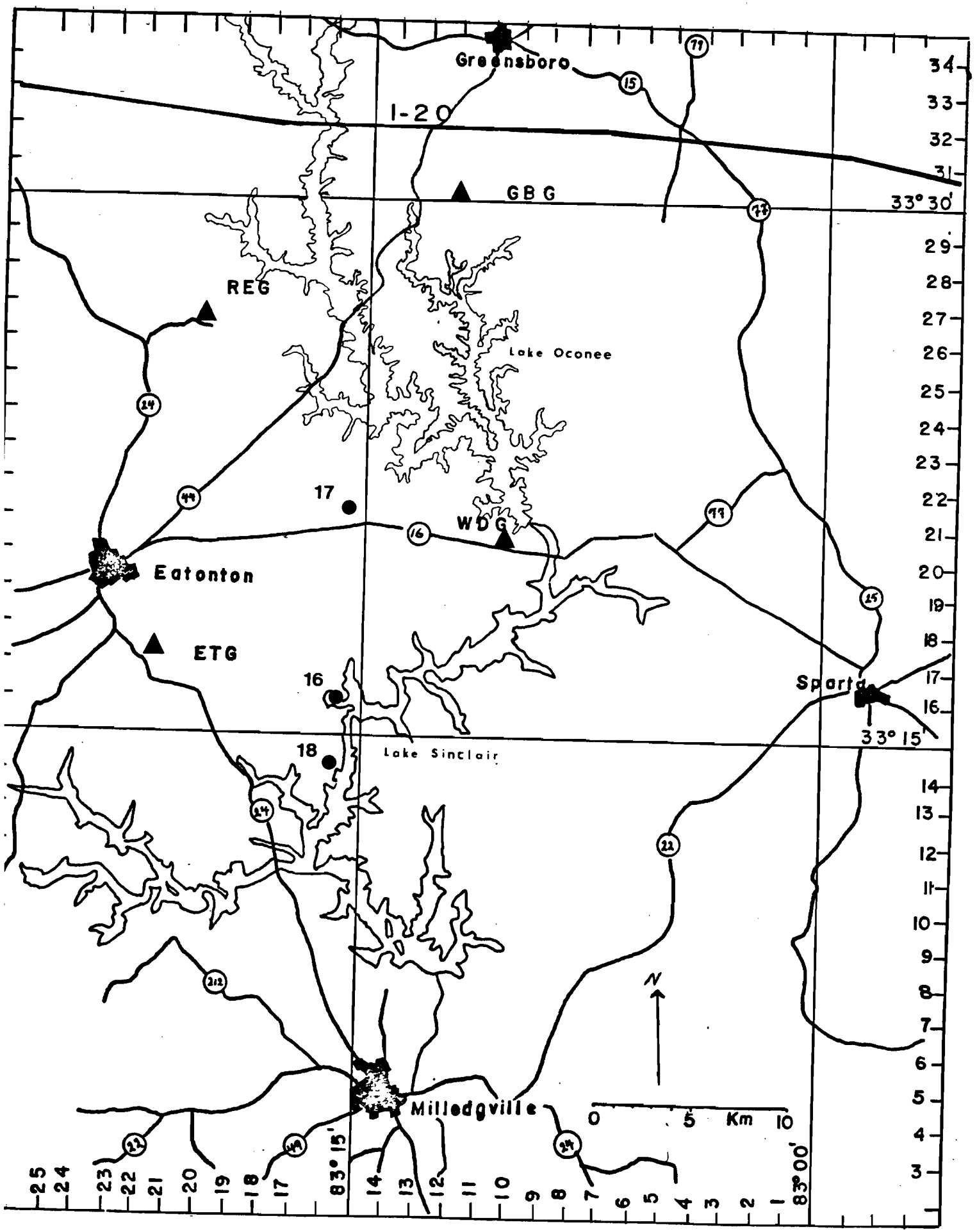
LTL/dp

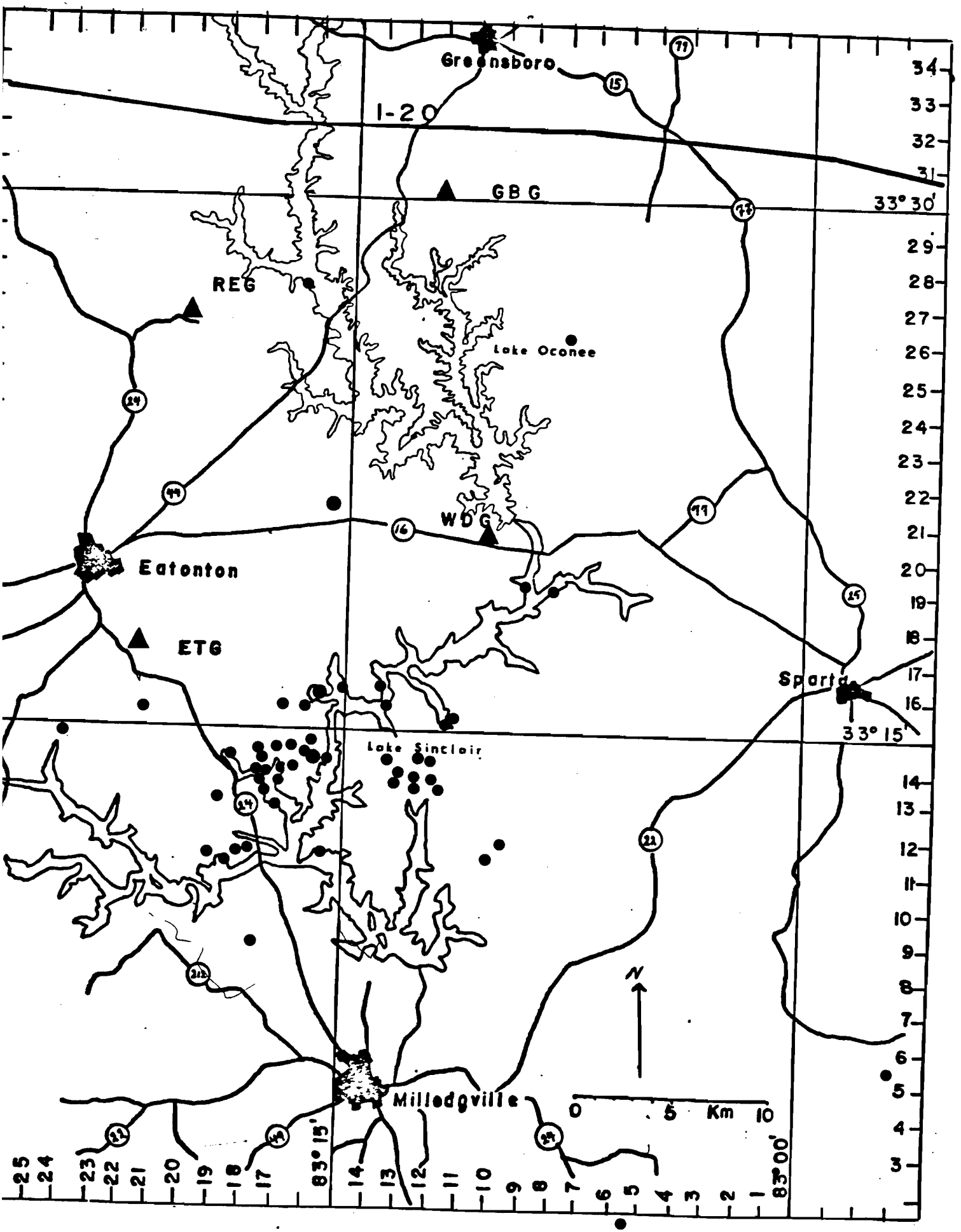
TABLE I

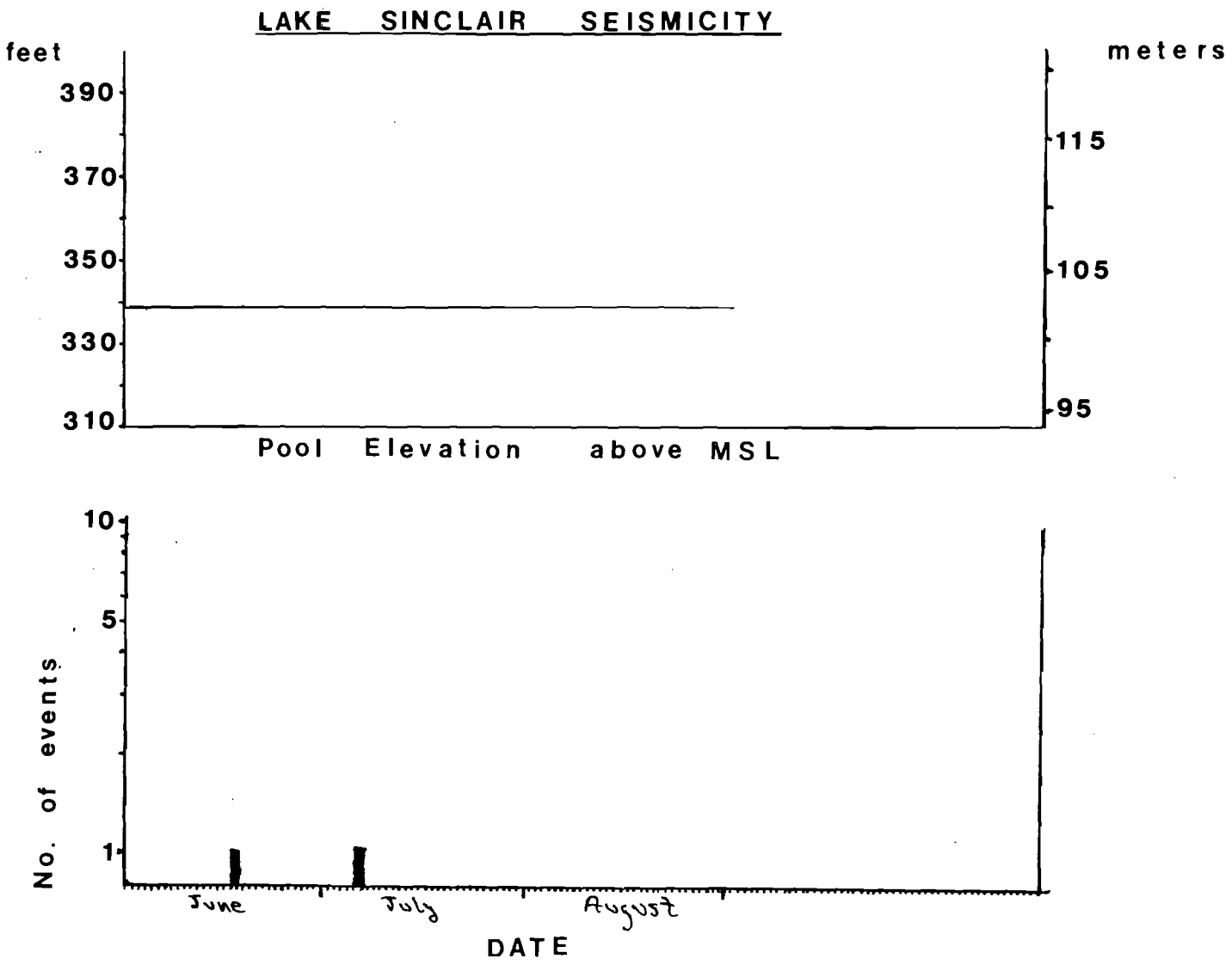
Date	Time	M_b Duration	Location
JUNE 11, 1979	04:12	3.8	near New Madrid, Mo.
JUNE 25, 1979	17:12	—	near Marked Tree, Ark.
JULY 19, 1979	09:27	2.5	S.E. Tenn. area
JULY 29, 1979	11:42	—	near Knoxville, Tenn.
AUG 6, 1979	15:21	2.0	N.E. of Newberry, S.C.
AUG 7, 1979	19:32	3.0	N.E. of Newberry, S.C.
AUG 7, 1979	23:26	—	Near New Madrid, Mo.
AUG 14, 1979	08:21	--	S.E. Tenn. area

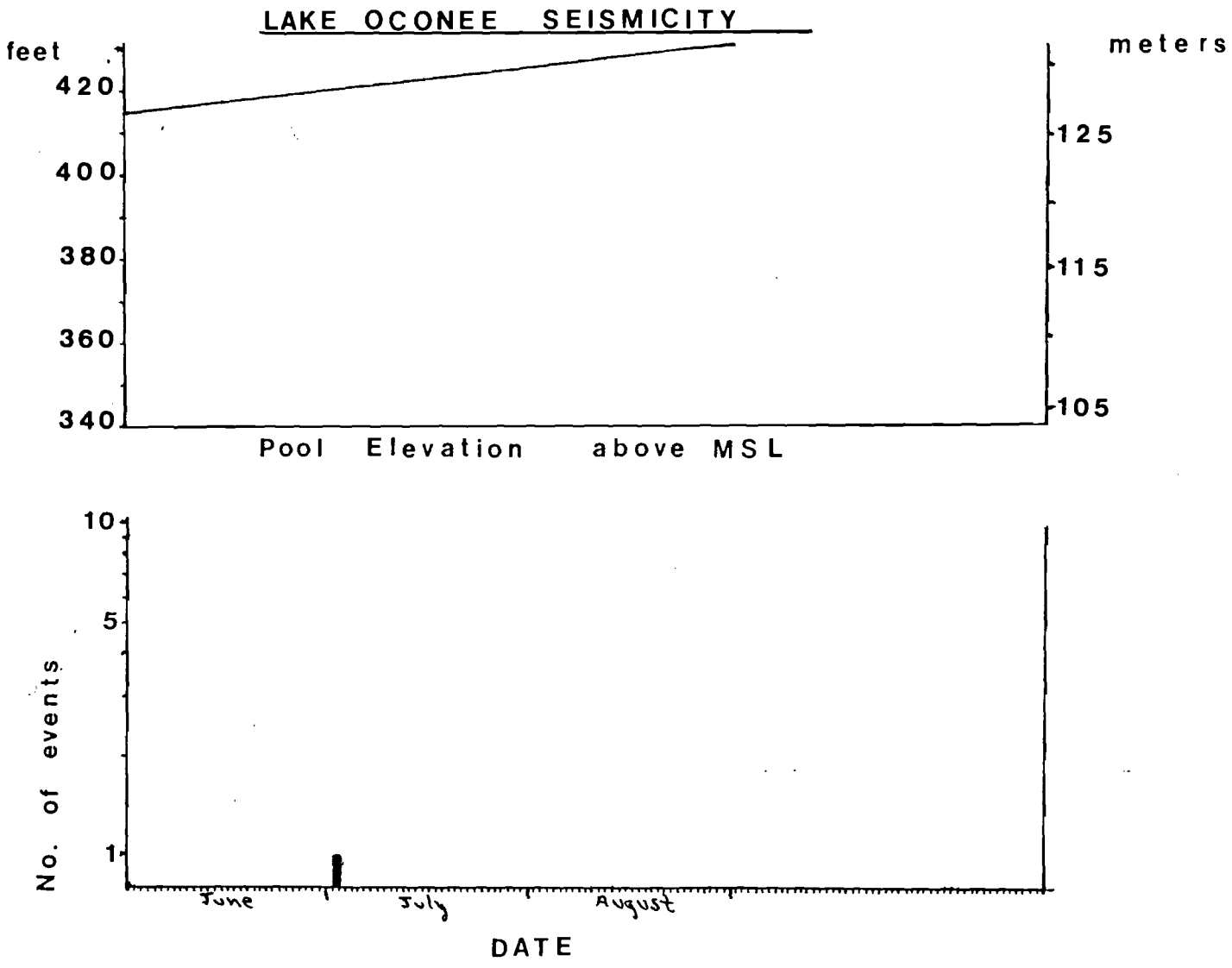
Table II

ID NO.	DATE	ORIGIN TIME	LATITUDE	LONGITUDE	DEPTH	MAGNITUDE
	LAKE SINCLAIR EVENT					
16	79/06/17	00:15:43.23	33.2655	83.2603	1.00C	0.3
	ETG PG	00:15: 44.600		+/- .100		
	ETG S-P	00:00: 1.300		+/- .100		
	REG PG	00:15: 47.100		+/- .100		
	REG S-P	00:00: 3.000		+/- .100		
	WDG PG	00:15: 46.300		+/- .100		
	WDG S-P	00:00: 1.600		+/- .100		
	LAKE OCONEE EVENT					
17	79/07/02	17:59:15.77	33.3544	83.3010	1.00C	0.5
	ETG PG	17:59: 17.200		+/- .100		
	ETG S-P	00:00: 1.250		+/- .100		
	GBG PG	17:59: 19.800		+/- .100		
	GBG S-P	00:00: 2.200		+/- .100		
	REG PG	17:59: 17.300		+/- .100		
	REG S-P	00:00: 1.300		+/- .100		
	WDG SLG	17:59: 19.800		+/- .200		
	LAKE SINCLAIR EVENT					
18	79/07/06	14:33:15.98	33.2372	83.2670	1.00C	0.2
	ETG PG	14:33: 17.500		+/- .100		
	ETG S-P	00:00: 1.500		+/- .100		
	REG PG	14:33: 20.400		+/- .100		
	REG S-P	00:00: 3.300		+/- .100		
	WDG PG	14:33: 19.600		+/- .100		
	WDG S-P	00:00: 2.100		+/- .100		


Greensboro
I-20
GBG
33°30'
REG
Lake Oconee
17
WDG
Eatonton
ETG
16
Sparta
33°15'
18
Lake Sinclair
N
Milledgville
0 5 Km 10
83°15'
83°00'


Greensboro
I-20
GBG
33° 30'
REG
Lake Oconee
WDG
Eatonton
ETG
Sparta
33° 15'
Lake Sinclair
Milledgville
N
0 5 Km 10
83° 15'
83° 00'


LAKE SINCLAIR SEISMICITY
feet
meters
390
370
350
330
310
115
105
95
Pool Elevation above MSL
10
5
1
No. of events
June
July
August
DATE


LAKE OCONEE SEISMICITY
feet
420
400
380
360
340
meters
125
115
105
Pool Elevation above MSL
10
5
1
No. of events
June
July
August
DATE

G-35-653

GEORGIA INSTITUTE OF TECHNOLOGY
SCHOOL OF GEOPHYSICAL SCIENCES
Atlanta, Georgia 30332
(404) 894-2857

December 19, 1979

Mr. R. C. Thrasher
Georgia Power Company
P. O. Box 4545
Atlanta, Georgia 30302

Subject: Quarterly Letter Report Number 13, covering period of 1 September to 30 November 1979

Re: Seismic monitoring near Wallace Dam, Georgia

Dear Sir:

The total cumulative percentage recording coverage for the Wallace Dam net for the period September 1, 1979 to November 30, 1979 was 98.99%. This corresponds to a cumulative percent coverage of 100% for September, 100% for October, and 97.5% for November. The lost time was due to telephone communication system failures.

Seismic activity for the period of this report in the Lake Sinclair and Lake Oconee area is tabulated in Table I. The areal distribution of these events is shown on the map in Figure I. The map in Figure II shows the distribution of all events (cumulative) so far recorded by the Wallace Dam Net.

The Lake Sinclair area has shown a marked increase in seismic activity during this reporting period. Most of these microearthquakes occurred in two distinct swarms centered at separate locations. The first swarm occurred on September 2 and continued through September 3 before tapering off with only a few microearthquakes occurring thereafter. The second swarm occurred on November 6 with the magnitude of each successive event somewhat larger than the preceding one until the early hours of November 7 when the main shock occurred with magnitude 2.2. Thereafter, the magnitudes began to decrease with each successive event. An attempt was made to monitor the aftershock sequence with portable seismometers but because of the rapid decay of magnitude following the main shock, only one very small event was recorded by the portable units. As can be seen in Figure I, both of these epicentral zones are situated towards the western reaches of the Lake Sinclair area. In order to obtain better locations for any future events in these areas we are considering the possibility of moving the seismometer now in operation at WDG to a new location south of ETG as soon as we have the three-component system operational at the present WDG location which should be by the end of December. We have had to return one of the geophones for the three-component system to the manufacturer for replacement due to a defect but we expect to have the replacement soon.

No microearthquakes were recorded in the Lake Oconee area during this reporting period. Several seismic signatures were recorded; these were located in an area approximated six miles northwest of Wallace Dam. The fact that these signatures are of constant magnitude and occur during the middle of the week approximately one or two weeks apart is felt to be sufficient evidence that they are not mocroearthquakes but are probably hard-rock blasts. We will be observing this activity in the future and will be attentive to any change in the character of these signatures.

If you have any questions concerning this report, please feel free to contact us directly.

Respectfully submitted,

Leland T. Long
Associate Professor

LTL/dp

TABLE I

ID NO.	DATE	ORIGIN TIME	LATITUDE	LONGITUDE	DEPTH	MAGNITUDE
	LAKE SINCLAIR EVENT					
6	79/09/02	06:02:49.39	33.2342	83.2564	1.00C	0.75
	ETG PG	06:02: 51.330		+/- .100		
	ETG S-P	00:00: 1.350		+/- .100		
	REG S	06:02: 57.500		+/- .500		
	WDG S	06:02: 55.200		+/- .200		
	LAKE SINCLAIR EVENT					
8	79/09/02	07:53:29.16	33.2455	83.2484	1.00C	0.5
	ETG PG	07:53: 31.100		+/- .100		
	ETG S-P	00:00: 1.330		+/- .100		
	REG S	07:53: 37.000		+/- .500		
	WDG S	07:53: 34.500		+/- .200		
	LAKE SINCLAIR EVENT					
5	79/09/02	08:37:13.88	33.2519	83.2496	1.00C	1.2
	ETG PG	08:37: 15.750		+/- .100		
	ETG S-P	00:00: 1.350		+/- .100		
	REG PG	08:37: 18.150		+/- .200		
	REG S-P	00:00: 3.050		+/- .200		
	WDG PG	08:37: 16.850		+/- .200		
	WDG S-P	00:00: 2.180		+/- .200		
	LAKE SINCLAIR EVENT					
7	79/09/02	08:54:39.40	33.2530	83.2499	1.00C	0.2
	ETG PG	08:54: 41.250		+/- .100		
	ETG S-P	00:00: 1.250		+/- .100		
	REG S	08:54: 47.000		+/- .500		
	WDG S	08:54: 44.500		+/- .200		
	LAKE SINCLAIR EVENT					
12	79/09/02	12:12: 2.36	33.2524	83.2585	1.00C	1.1
	ETG PG	12:12: 4.100		+/- .100		
	ETG S-P	00:00: 1.250		+/- .100		
	REG PG	12:12: 6.400		+/- .200		
	REG S-P	00:00: 3.150		+/- .200		
	WDG PG	12:12: 5.500		+/- .200		
	WDG S-P	00:00: 2.100		+/- .200		
	LAKE SINCLAIR EVENT					
13	79/09/02	22:16:52.41	33.2415	83.2714	1.00C	0.5
	ETG PG	22:16: 54.100		+/- .200		
	ETG S-P	00:00: 1.250		+/- .200		
	REG PG	22:16: 58.000		+/- .400		
	REG S-P	00:00: 3.050		+/- .400		
	WDG S	22:16: 58.300		+/- .200		

```
  LAKE SINCLAIR EVENT
14   79/09/03 17:49:36.36  33.2679   83.2465   1.00C 0.25
       ETG  PG       17:49: 38.200    +/-   .100
       ETG  S-P      00:00:  1.350    +/-   .100
       REG  S        17:49: 43.000    +/-   .400
       WDG  S        17:49: 41.100    +/-   .200
  LAKE SINCLAIR EVENT
15   79/09/06 16:21:56.64  33.2507   83.2492   1.00C 0.75
       ETG  PG       16:21: 58.500    +/-   .100
       ETG  S-P      00:00:  1.350    +/-   .100
       REG  PG       16:22:  1.000    +/-   .200
       REG  S-P      00:00:  3.100    +/-   .200
       WDG  S        16:22:  1.900    +/-   .100
  LAKE SINCLAIR EVENT
16   79/09/09 07:03: 9.30  33.2711   83.2409   1.00C 0.0
       ETG  PG       07:03: 11.330    +/-   .100
       ETG  S-P      00:00:  1.250    +/-   .100
       REG  PG       07:03: 12.900    +/-   .200
       REG  S-P      00:00:  3.100    +/-   .200
  LAKE SINCLAIR EVENT
17   79/09/17 16:38: 2.57  33.2701   83.2378   1.00C 0.25
       ETG  PG       16:38:  4.300    +/-   .100
       ETG  S-P      00:00:  1.450    +/-   .100
       REG  PG       16:38:  6.900    +/-   .200
       REG  S-P      00:00:  3.000    +/-   .200
       WDG  PG       16:38:  5.200    +/-   .100
       WDG  S-P      00:00:  1.600    +/-   .100
  LAKE SINCLAIR EVENT
33   79/11/06 09:49:41.02  33.2420   83.4081   1.00C -0.75
       ETG  PG       09:49: 42.300    +/-   .200
       ETG  S-P      00:00:  1.200    +/-   .200
       REG  PG       09:49: 45.300    +/-   .100
       REG  S-P      00:00:  3.000    +/-   .100
  LAKE SINCLAIR EVENT
34   79/11/06 10:20:56.48  33.2587   83.4392   1.00C -0.8
       ETG  PG       10:20: 58.100    +/-   .100
       ETG  S-P      00:00:  1.250    +/-   .100
       REG  PG       10:21:   .600    +/-   .100
       REG  S-P      00:00:  2.950    +/-   .100
  LAKE SINCLAIR EVENT
35   79/11/06 10:21:10.80  33.2529   83.4352   1.00C -0.75
       ETG  PG       10:21: 12.400    +/-   .100
       ETG  S-P      00:00:  1.250    +/-   .100
       REG  PG       10:21: 15.000    +/-   .100
       REG  S-P      00:00:  3.000    +/-   .100
```

```
  LAKE SINCLAIR EVENT
36   79/11/06 11:08:37.05  33.2538   83.4364   1.00C -0.75
       ETG  PG       11:08: 38.600    +/-   .300
       ETG  S-P      00:00:  1.250    +/-   .100
       REG  PG       11:08: 41.300    +/-   .300
       REG  S-P      00:00:  3.000    +/-   .100
  LAKE SINCLAIR EVENT
37   79/11/06 16:45:22.15  33.2563   83.4394   1.00C 0.25
       ETG  PG       16:45: 23.800    +/-   .100
       ETG  S-P      00:00:  1.250    +/-   .100
       REG  PG       16:45: 26.300    +/-   .100
       REG  S-P      00:00:  3.000    +/-   .100
  LAKE SINCLAIR EVENT
38   79/11/06 23:20:14.60  33.2573   83.4305   1.00C 0.40
       ETG  PG       23:20: 16.030    +/-   .500
       GBG  PG       23:20: 20.300    +/-   .500
       ETG  S-P      00:00:  1.250    +/-   .100
       GBG  S-P      00:00:  4.200    +/-   .200
       REG  PG       23:20: 19.200    +/-   .500
       REG  S-P      00:00:  3.000    +/-   .100
  LAKE SINCLAIR EVENT
39   79/11/07 01:39:20.85  33.2500   83.4312   1.00C -0.75
       ETG  PG       01:39: 22.200    +/-   .500
       ETG  S-P      00:00:  1.250    +/-   .100
       REG  PG       01:39: 25.300    +/-   .500
       REG  S-P      00:00:  3.000    +/-   .100
  LAKE SINCLAIR EVENT
40   79/11/07 02:21:24.68  33.2282   83.3218   1.00C 2.2
       ETG  PG       02:21: 25.500    +/-   .500
       ETG  S-P      00:00:  1.250    +/-   .100
       GBG  PG       02:21: 30.800    +/-   .500
       GBG  S-P      00:00:  4.200    +/-   .100
       REG  PG       02:21: 29.100    +/-   .500
       REG  S-P      00:00:  3.000    +/-   .100
       WDG  PG       02:21: 28.900    +/-   .500
       WDG  S-P      00:00:  2.930    +/-   .200
  LAKE SINCLAIR EVENT
42   79/11/07 03:02:   .07  33.2521   83.4341   1.00C -0.75
       ETG  PG       03:03:  1.500    +/-   .500
       ETG  S-P      00:00:  1.250    +/-   .100
       REG  PG       03:03:  4.450    +/-   .500
       REG  S-P      00:00:  3.000    +/-   .100
```

```
  LAKE SINCLAIR EVENT
41   79/11/07 04:17:52.41  33.2283   83.3037   1.00C 0.5
       ETG  PG       04:17: 53.900    +/-   .500
       ETG  S-P      00:00:  1.250    +/-   .100
       GBG  PG       04:17: 58.100    +/-   .500
       GBG  S-P      00:00:  4.200    +/-   .100
       REG  PG       04:17: 56.700    +/-   .500
       REG  S-P      00:00:  3.000    +/-   .100
       WDG  S-P      00:00:  2.900    +/-   .100
       WDG  PG       04:17: 56.400    +/-   .500
  LAKE SINCLAIR EVENT
43   79/11/07 05:27:44.40  33.2457   83.4249   1.00C -0.75
       ETG  PG       05:27: 45.600    +/-   .500
       ETG  S-P      00:00:  1.250    +/-   .100
       REG  PG       05:27: 49.000    +/-   .500
       REG  S-P      00:00:  3.000    +/-   .100
  LAKE SINCLAIR EVENT
47   79/11/08 23:55:55.35  33.2561   83.4280   1.00C 0.5
       ETG  PG       23:55: 56.900    +/-   .100
       ETG  S-P      00:00:  1.250    +/-   .100
       GBG  PG       23:56:   .900    +/-   .200
       GBG  S-P      00:00:  4.200    +/-   .200
       REG  PG       23:55: 59.650    +/-   .100
       REG  S-P      00:00:  3.000    +/-   .100
  LAKE SINCLAIR EVENT
44   79/11/09 13:47:46.60  33.2662   83.4501   1.00C -0.5
       ETG  PG       13:47: 48.400    +/-   .100
       ETG  S-P      00:00:  1.250    +/-   .100
       REG  PG       13:47: 50.600    +/-   .100
       REG  S-P      00:00:  3.000    +/-   .100
  LAKE SINCLAIR EVENT
45   79/11/24 22:28:   .87  33.2347   83.2614   1.00C 0.5
       ETG  PG       22:28:  2.870    +/-   .100
       ETG  S-P      00:00:  1.250    +/-   .100
       GBG  PG       22:28:  6.400    +/-   .100
       GBG  S-P      00:00:  4.200    +/-   .100
       REG  PG       22:28:  5.300    +/-   .100
       REG  S-P      00:00:  3.000    +/-   .100
       WDG  PG       22:28:  4.050    +/-   .100
       WDG  S-P      00:00:  2.600    +/-   .100
```

FIGURE 1

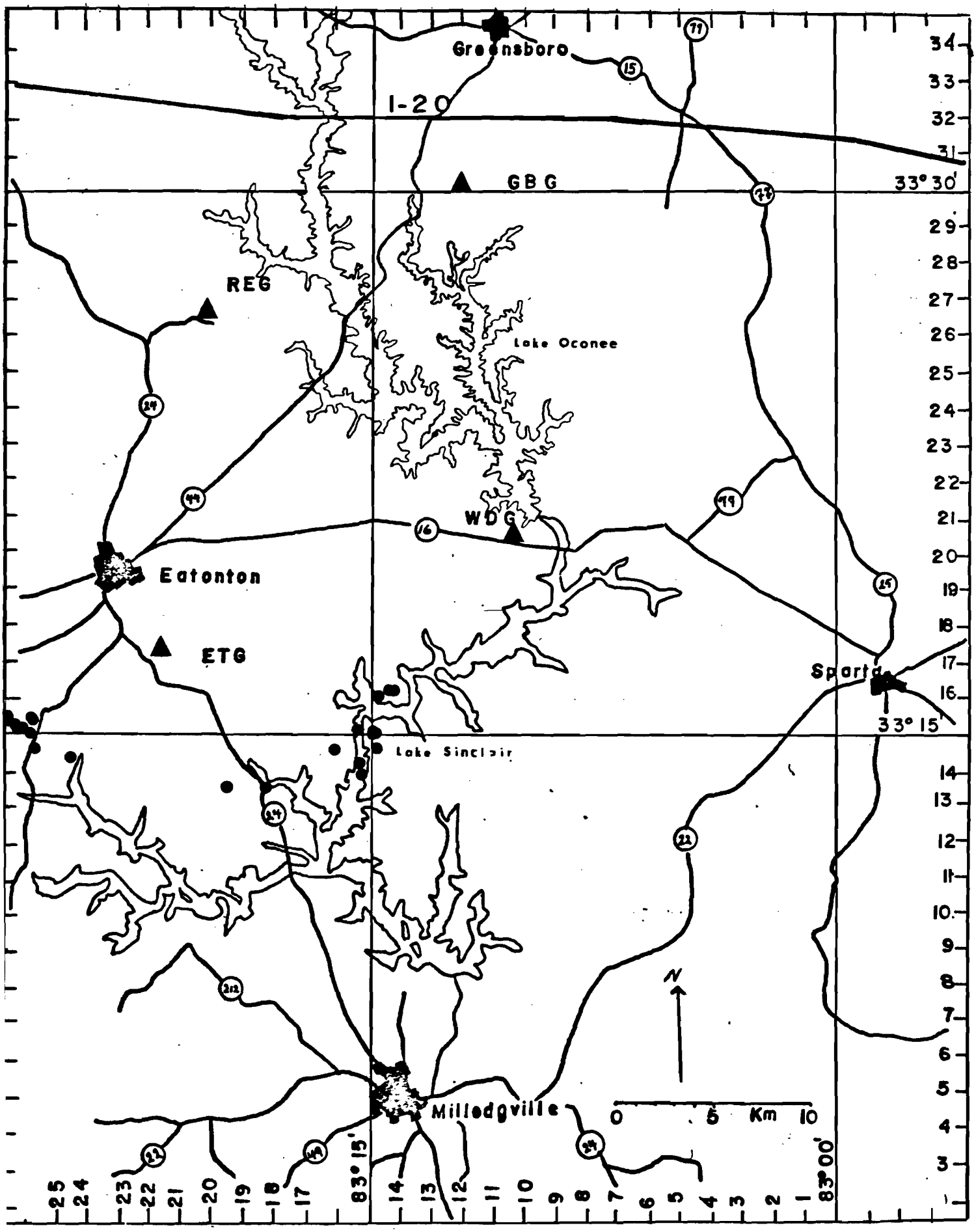
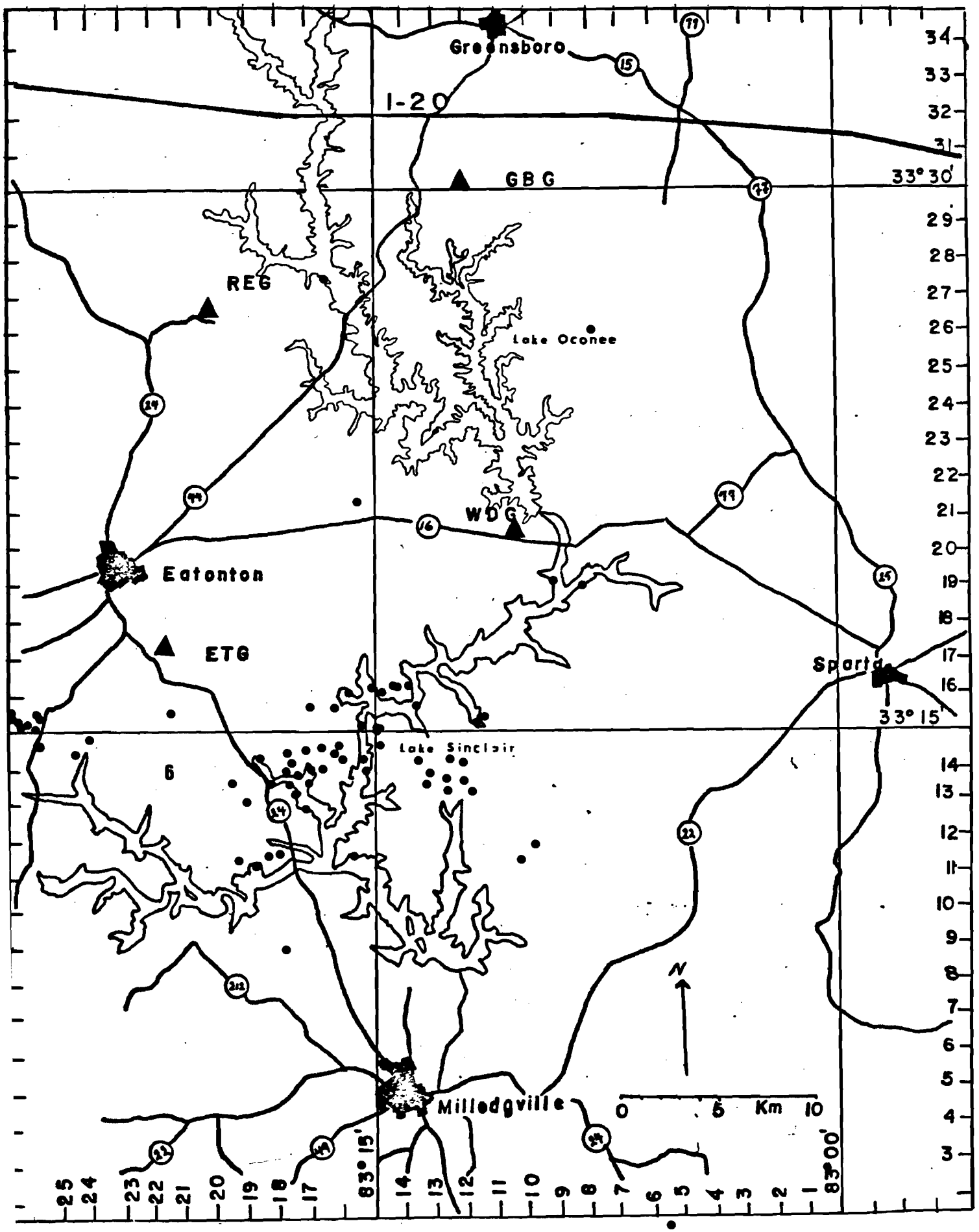

Greensboro
I-20
GBG
33° 30'
REG
Lake Oconee
WDG
Eatonton
ETG
Sparta
33° 15'
Lake Sinclair
Milledgville
N
0 5 Km 10
83° 15'
83° 00'

FIGURE II


Greensboro
I-20
GBG
33° 30'
REG
Lake Oconee
WDG
Eatonton
ETG
Sparta
33° 15'
Lake Sinclair
Milledgville
N
0 5 Km 10
83° 15'
83° 00'

G-35-65

GEORGIA INSTITUTE OF TECHNOLOGY
SCHOOL OF GEOPHYSICAL SCIENCES
Atlanta, Georgia 30332
(404) 894-2857

March , 1980

Mr. R. C. Thrasher
Georgia Power Company
P. O. Box 4545
Atlanta, Georgia 30302

Subject: Quarterly Letter Report Number 14, covering the period from 1 December 1979 to 29 February 1980.

Re: Seismic monitoring near Wallace Dam, Georgia.

Dear Sir:

The total cumulative percentage recording coverage for the Wallace Dam seismic net for the period 1 December 1979 to 29 February 1980 was 99.22%. This corresponds to a cumulative percent coverage of 99.06% for December, 100% for January, and 98.56% for February. The lost time was due to telephone communication system failures and recorder pen problems.

Seismic activity for the period of this report in the Lake Sinclair and Lake Oconee areas is tabulated in Table I. The areal distribution of these events is shown on the map in Figure I. The map in Figure II shows the distribution of all events (cumulative) thus far recorded by the Wallace Dam net.

Seismic activity in the Lake Sinclair area returned to a quieter level during this reporting period after last quarter's increase in activity. Two microearthquakes occurred in the immediate vicinity of Lake Sinclair and two were observed outside the immediate area of the lake. One of these was located northeast of Sparta while the other occurred southwest of Eatonton, the latter being in an area where microearthquakes have been previously observed (see Figure II).

No microearthquakes were recorded in the Lake Oconee area during this reporting period. The anomalous seismic signatures reported last quarter as having occurred in the Lake Oconee area approximately six miles northwest of Wallace Dam have not been observed during this reporting period. We therefore believe that our original supposition that these were blasts was correct.

TABLE I

ID NO.	DATE	ORIGIN TIME	LATITUDE	LONGITUDE	DEPTH	MAGNITUDE
	LAKE SINCLAIR EVENT					
22	80/01/09	06:51:38.28	33.2070	83.2618	1.00C	0.2
	ETG PG	06:51: 40.500	+/-	.100		
	ETG S-P	00:00: 1.700	+/-	.100		
	GBG PG	06:51: 44.500	+/-	.100		
	GBG S-P	00:00: 4.400	+/-	.100		
	REG PG	06:51: 43.150	+/-	.100		
	REG S-P	00:00: 3.600	+/-	.100		
	WDG PG	06:51: 42.100	+/-	.100		
	WDG S-P	00:00: 2.800	+/-	.100		
	SPARTA EVENT					
32	80/01/13	08:03:34.16	33.2986	82.9483	1.00C	0.2
	ETG PG	08:03: 40.900	+/-	.400		
	ETG S-P	00:00: 4.950	+/-	.400		
	GBG PG	08:03: 40.200	+/-	.100		
	GBG S-P	00:00: 4.330	+/-	.100		
	REG PG	08:03: 41.350	+/-	.100		
	REG S-P	00:00: 5.350	+/-	.100		
	LAKE SINCLAIR EVENT					
18	80/01/19	08:25:12.49	33.2970	83.4403	1.00C	0.2
	ETG PG	08:25: 14.250	+/-	.100		
	ETG S-P	00:00: 1.200	+/-	.100		
	GBG PG	08:25: 17.450	+/-	.100		
	GBG S-P	00:00: 4.580	+/-	.100		
	REG PG	08:25: 16.350	+/-	.100		
	WDG S-P	00:00: 3.130	+/-	.100		
	LAKE SINCLAIR EVENT					
9	80/02/05	14:53: 2.64	33.2228	83.2498	1.00C	1.5
	ETG PG	14:53: 4.930	+/-	.100		
	ETG S-P	00:00: 1.500	+/-	.100		
	GBG PG	14:53: 8.380	+/-	.300		
	GBG S-P	00:00: 4.030	+/-	.300		
	WDG PG	14:53: 6.000	+/-	.200		
	WDG S-P	00:00: 3.050	+/-	.300		

FIGURE 1

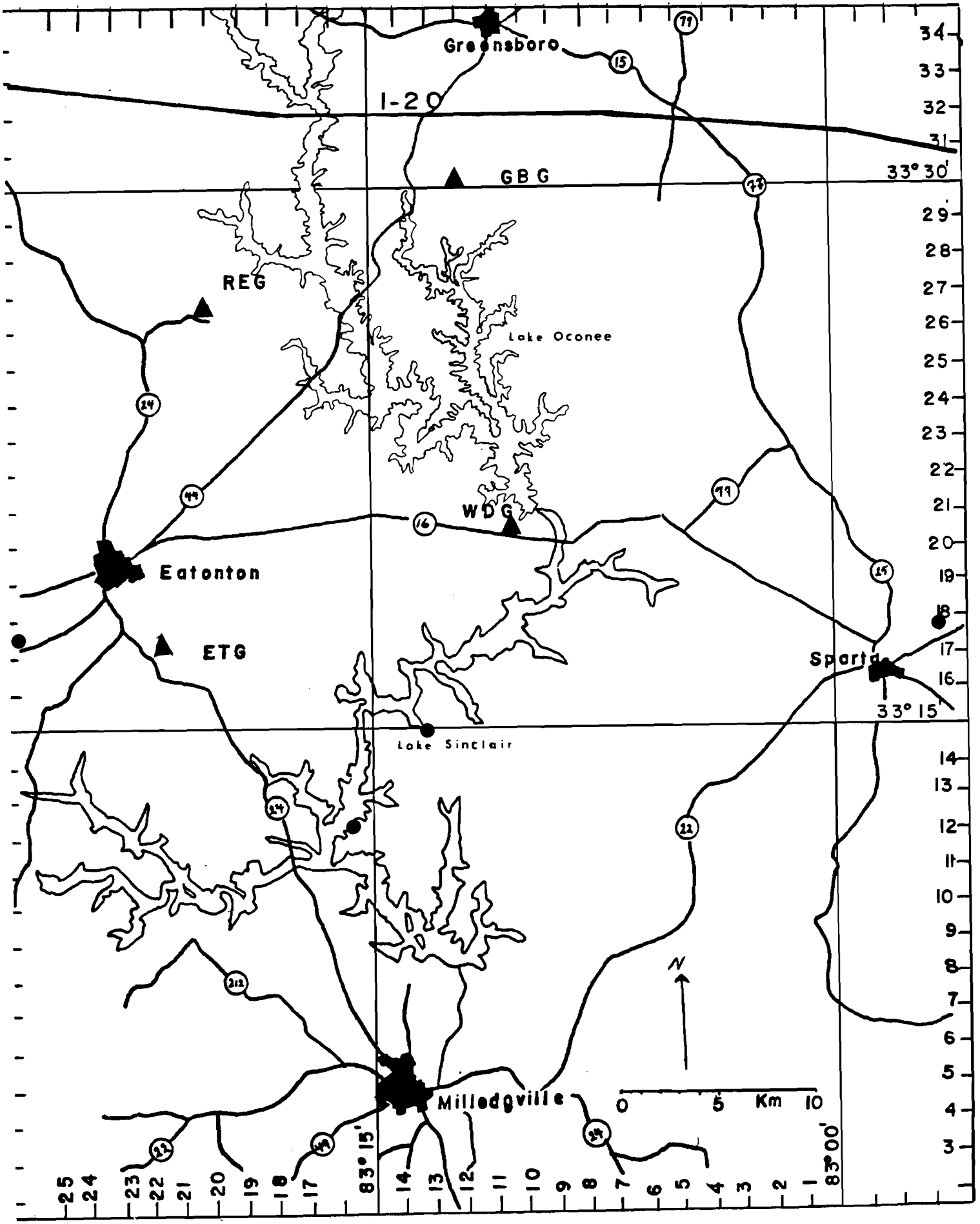
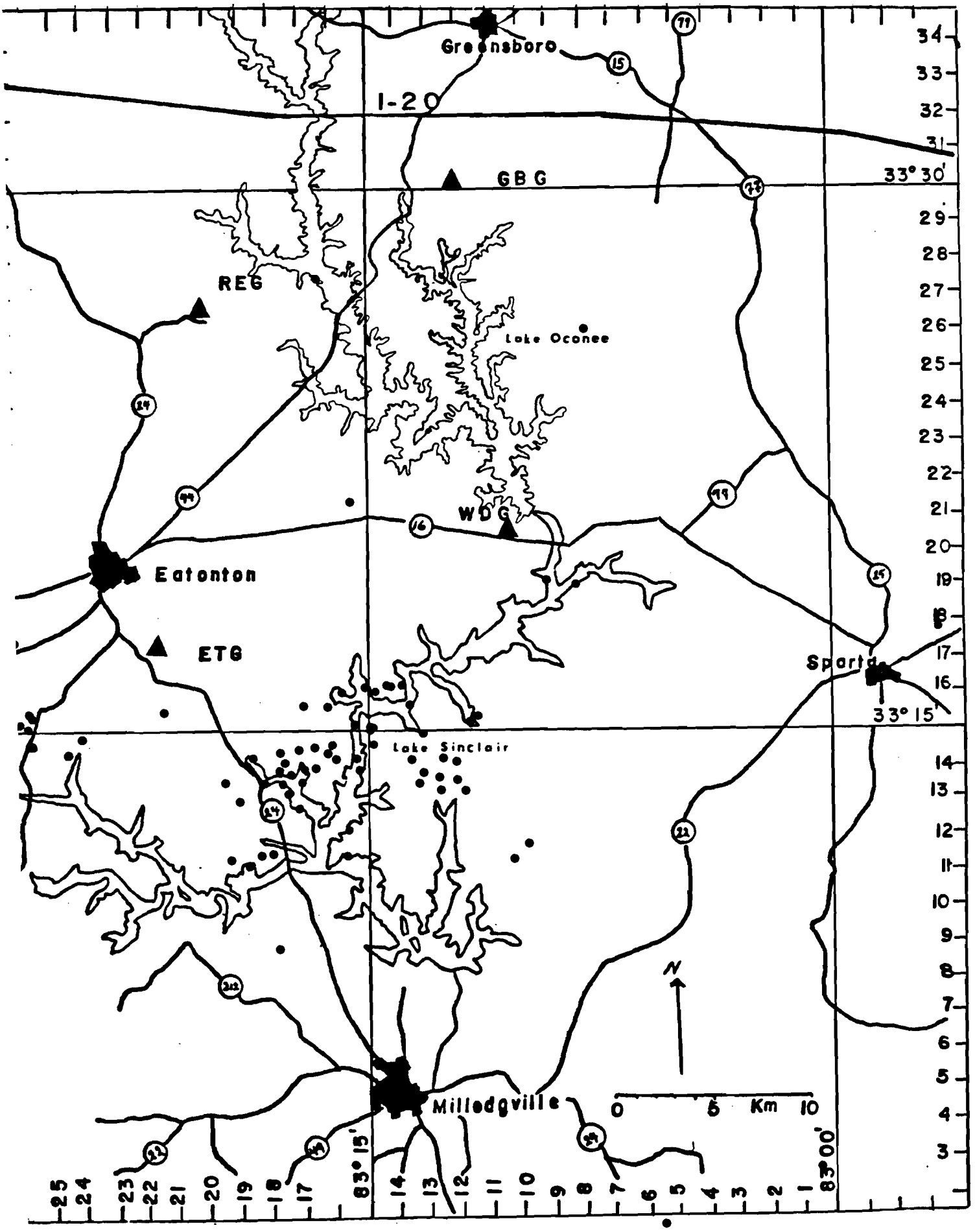

Greensboro
I-20
GBG
REG
Lake Oconee
WDG
Eatonton
ETG
Sparta
Lake Sinclair
Milledgville
N
0 5 Km 10
33° 30'
33° 15'
83° 15'
83° 00'

FIGURE II


Greensboro
I-20
GBG
REG
Lake Oconee
WDG
Eatonton
ETG
Sparta
Lake Sinclair
Milledgville
N
0 5 Km 10
33° 30'
33° 15'
83° 15'
83° 00'

Please note that we have included with this report documentation of new instrumentation and location for station WDG. Also, the results of a recent seismic refraction survey conducted in the area utilizing blasts at Wallace Dam as the seismic source are presented.

If you have any questions concerning this report, please feel free to contact us directly.

Respectfully submitted,

Leland T. Long
Associate Professor

LTL/dp

New Location and Instrumentation at Station WDG

In late December, 1979, the location and instrumentation at station WDG were changed.

New Location

The new location is very near the old site; Figure I shows the relation of both old and new sites to Georgia Power Company property lines. Please note that both old and new sites are on Georgia Power property. The latitude and longitude of the old WDG site was:

Latitude $33^{o}.3440$N
Longitude $83^{o}.1752$W

The approximate location of the new site is:

Latitude $33^{o}.3457$N
Longitude $83^{o}.1737$W

as determined from 1972 U.S.G.S. Rockville 7 1/2' Quadrangle topographic map. An exact determination of location by Georgia Power Company would be most helpful. We would appreciate the earliest possible receipt of this data so that the station may be used more effectively in locating microearthquakes in the Lake Sinclair area, as well as any possible future activity in the Lake Oconee area.

New Instrumentation

The equipment at the old WDG site consisted of a Mark Products Model L-4 short-period seismometer with a natural frequency of 1 Hz. This seismometer utilizes a conventional spring-mass mechanism to convert displacement signals into velocity signals, it therefore requires a mass with freedom of motion which moves through an electromagnetic field inducing an emf in a surrounding coil.

At the old WDG site, the output of the seismometer was input to a preamplifier/voltage controlled oscillator (VCO) unit. This unit accepts seismic signals in the microvolt to millivolt range, amplifies and filters them, and frequency modulates an audio carrier with the seismic signal. The carrier frequency at the old site was 1700 Hz. This frequency modulated signal was transmitted by telephone link to Georgia Tech for continuous recording on a pen and ink helical recorder and non-continuous event recording on magnetic tape.

The entire field unit was enclosed in a PVC pipe 4 inches in diameter approximately 3 feet in length buried so that the top of the pipe is level with the ground surface. This exact same field set-up is currently in use at stations GBG, REG, and ETG, each operating at its own carrier frequency.

The new equipment at the new WDG site provides for detection of horizontal ground motion in both the North-South (NS) and East-West (EW) directions, as well as vertical (Z) ground motion. Three Teledyne-Geotech short-period Model S-500 seismometers are used, one for each direction; NS, EW and Z. The S-500 can be used vertically, horizontally, or at any inclination without modifications or adjustments. This seismometer is also different from the Mark Products in that rather than inducing an emf field, the motion of the mass instead exerts variable pressure on a quartz crystal which produces microvoltage due to a piezoelectric effect. The natural frequency of the S-500 is the same as the L-4, that is 1 Hz.

The addition of two more seismometers necessitated the addition of two more Preamp/VCO units. These units are essentially the same as those described earlier. The carrier frequencies of all three units have been selected so as to avoid duplication of frequencies already in use in the Wallace Dam Seismic Net. The frequencies currently being used are

GBG 680 Hz
REG 1360 Hz
ETG 2380 Hz
WDG 1020 Hz (North-South)
WDG 2040 Hz (East-West)
WDG 2720 Hz (Vertical)
(undesignated) 1700 Hz

At WDG, the frequency modulated carrier signals from each VCO unit are conditioned for on-site mixing so that all three may be sent by a single telephone link to the phone company mixing station where the other station signals, i.e. GBG, REG, and ETG are added for transmission to Georgia Tech. We plan to record one component from WDG continuously, probably vertical, with a pen and ink helical recorder. All three WDG components will be reocrded non-continuously on our magnetic tape event recording system.

The seismometers at WDG are arranged so as to provide a right-handed x, y, z coordinate system. This orientation is illustrated in Figure II.

In order to maintain operating voltage, we have installed two solar power panels with a maximum output of 180 milliamperes at 15 volts each. These are wired in series to provide maximum (sunny day) output voltage of 30 volts. A 24 volt battery pack is charged continuously by the solar panels during daylight hours to act as a reservoir for maintaining proper operating voltage for the three geophones as well as the preamp/VCO for each component.

The entire system, with the obvious exception of the solar panels, is locked inside a steel box two feet square, sixteen inches deep, embedded in concrete and buried so that the top is a couple of inches below the surface of the ground. The solar panels are located in the top of a nearby oak tree.

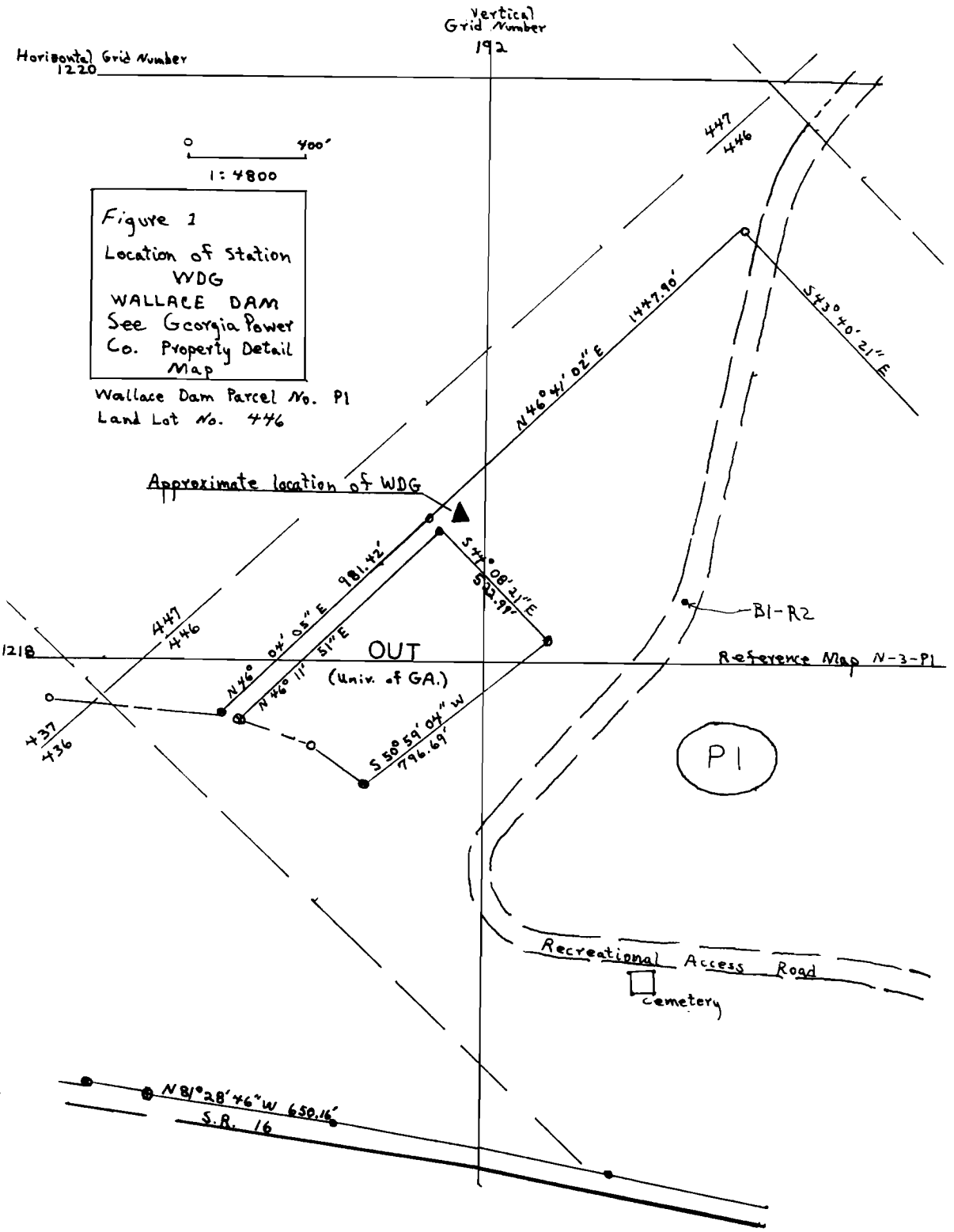
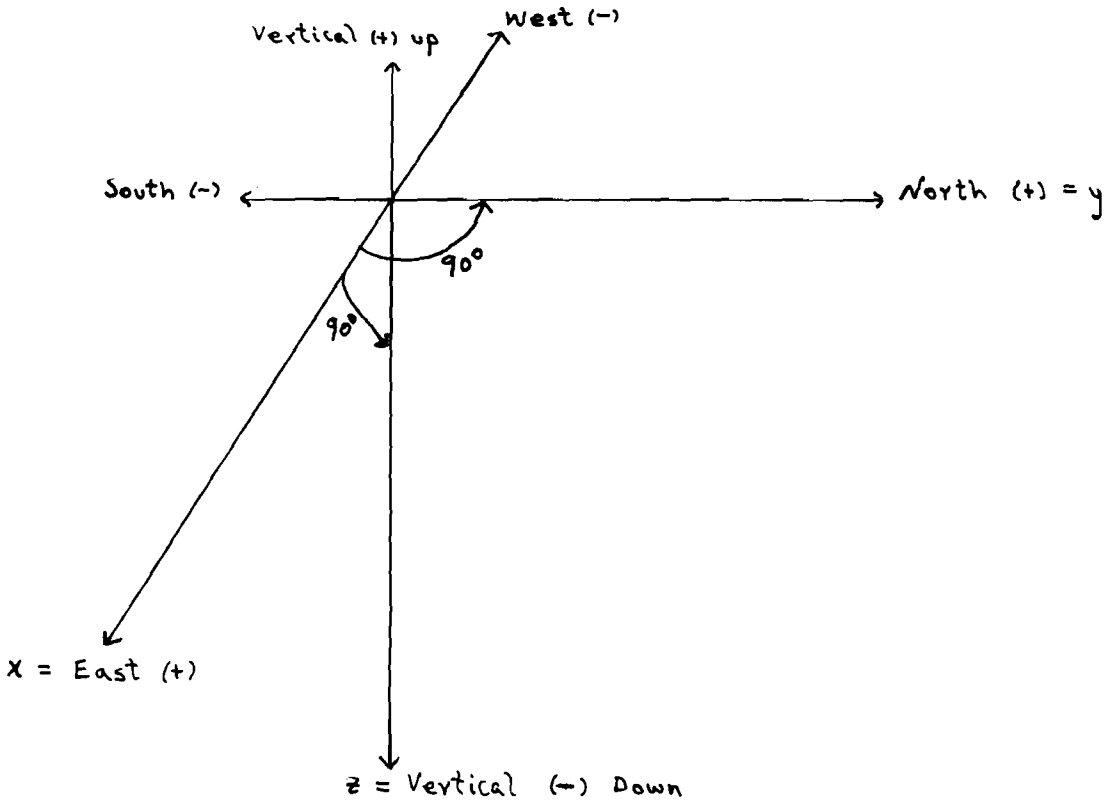

Vertical Grid Number
192
Horizontal Grid Number
1220
0
400'
1:4800
Figure 1
Location of Station
WDG
WALLACE DAM
See Georgia Power Co. Property Detail Map
Wallace Dam Parcel No. P1
Land Lot No. 446
447
446
N 46° 41' 02" E 1447.90'
S 43° 40' 21" E
Approximate location of WDG
S 47° 08' 21" E 523.99'
N 46° 04' 05" E 981.42'
N 46° 11' 51" E
447
446
1218
OUT
(Univ. of GA.)
Reference Map N-3-P1
B1-R2
437
436
S 50° 59' 04" W 796.69'
P1
Recreational Access Road
cemetery
N 81° 28' 46" W 650.16'
S.R. 16

Figure 2. Orientation of Geophones at WDG illustrating x, y, z right-hand coordinate system.



Determination of Direct Compressional and Shear Wave Velocities in the Vicinity of the Wallace Dam near Eatonton, Georgia

by

Jerry D. Allison

Introduction

Since 1977, Georgia Institute of Technology has operated a seismic monitoring network for Georgia Power Company in the vicinity of the Wallace Dam, a Georgia Power project, near Eatonton, Georgia. This net is capable of detecting microearthquakes of duration magnitude 0.0 within a 20 km radius of the dam. The largest local event recorded by the Wallace Dam network since installation was of 2.4 duration magnitude on May 2, 1978. Most events in the area are between 0.0 and 1.5 magnitude, although larger events were infrequently recorded by the ATL WWSS station near Atlanta before installation of the net. At any rate, seismic activity in the area is well documented and not expected to cease in the foreseeable future.

This study was undertaken in order to refine the travel-time curves for direct compressional (PG) waves and shear (S) waves and thus provide more accurate epicenter determinations for these events.

The distribution of stations for the study is shown in Figure I. The dark triangles indicate permanent G.I.T. stations, the dark squares represent temporary portable stations. The seismic source was conveniently provided by Georgia Power Company in the form of chemical explosions at a blasting site near the dam in conjunction with ongoing construction. The blast site is also shown in Figure I, denoted with a star.

Geology of the Study Area

The study area is situated approximately 80 miles east of Atlanta in the vicinity of Eatonton and Greensboro, Georgia. Reference to the Geologic Map of Georgia (1976) shows the dominant surface rock to be metamorphic ranging from low-grade schists to high-grade gneisses and granite-gneisses. Other granites are of an obvious intrusive nature, this being deduced from cross-cutting structural relations (see Figure II). Many of the granites, gneisses, and schists show secondary rock cleavage but fracture patterns are complex and vary from one locale to another. The structural relations of the various units are locally quite complex and the details of the structural geology have never been fully investigated in this area, due perhaps to the dense vegetation and paucity of good outcrops. The general trend of most units however is to the northeast with dips between 25° and 45° southeast.

Procedure

As already noted, the source for the seismic waves was provided by blasts at the Wallace Dam construction site. Because the source was very close to WDG, the permanent seismometer nearest the dam, and because the location of the blast site was known to within ±100 meters, it was not necessary to place a seismometer in the direct vicinity of the blasts to obtain origin times. Instead, the wavefront moving away from the blast and passing through WDG at a known time was plotted along a constant radius all the way around the source location as illustrated in Figure III. This study assumes that though the velocity may change

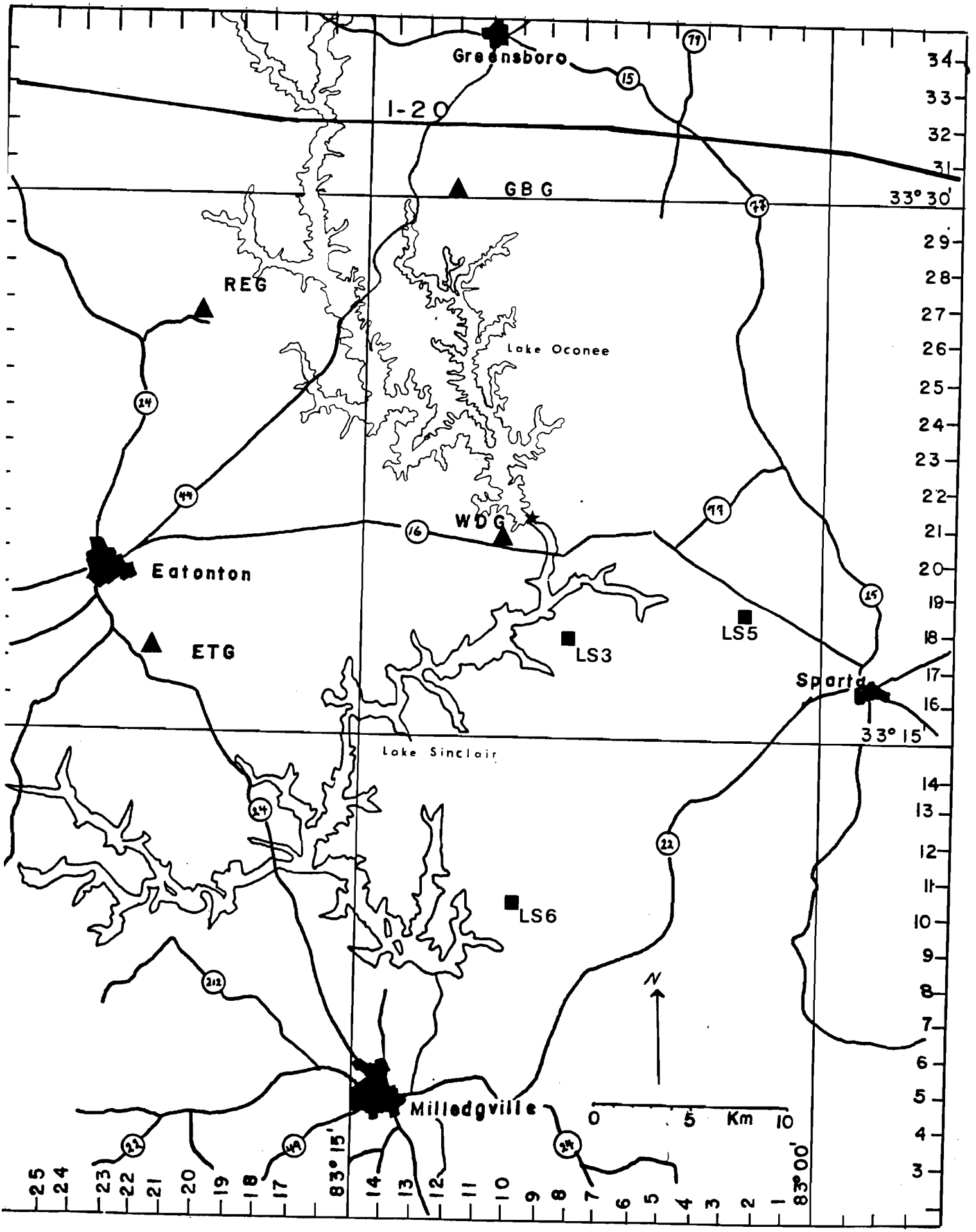
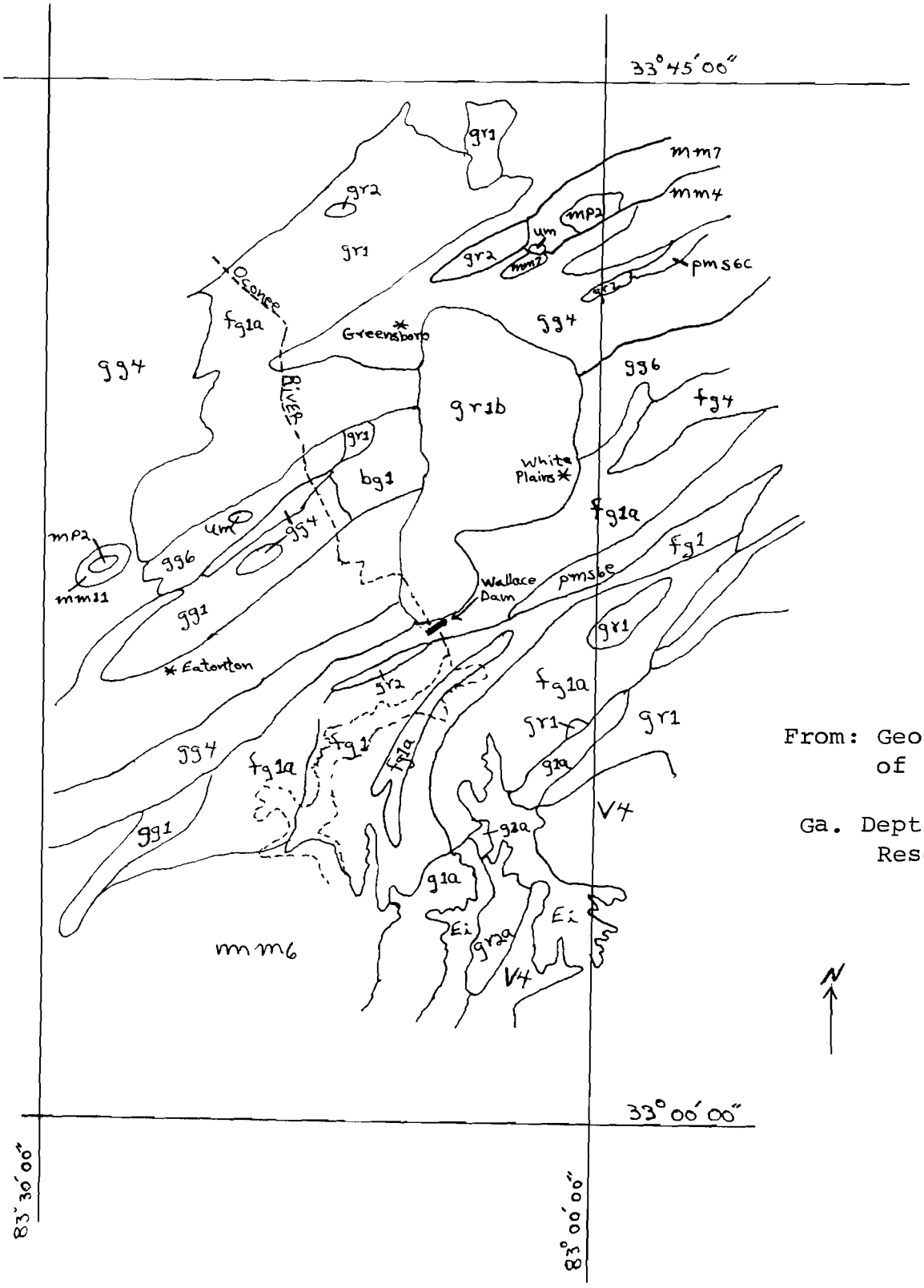

Greensboro
I-20
GBG
REG
Lake Oconee
WDG
Eatonton
ETG
LS3
LS5
Sparta
Lake Sinclair
LS6
Milledgville
N
0 5 Km 10
33° 30'
33° 15'
83° 15'
83° 00'

Figure I

Figure II. Geologic Map of Survey Area



From: Geologic Map
of Georgia (1976)

Ga. Dept. of Natural
Resources

Key to Geologic Map of Survey Area

ggl	Undifferentiated granite gneiss
gg4	Granite gneiss/Amphibolite
gg6	Granite gneiss/Granite
fgl	Biotite gneiss/Feldspathic Biotite gneiss
fgla	Biotite granite gneiss/Feldspathic Biotite gneiss/Amphibolite
fg4	Biotite gneiss/Amphibolite
gla	Quartzite Mica Schist
grl	Undifferentiated Granite
grlb	Porphyritic Granite
gr2	Granite/Granite gneiss
gr2a	Granite/Gneissic Biotite Granite
bgl	Biotite gneiss
pms6c	Sericite Schist/Micaceous Quartzite/Sericite phyllite
pms6e	Quartz mica schist/Hornblende schist/Biotite gneiss
mm4	Hornblende gneiss/Amphibolite granite gneiss
mm6	Hornblende gneiss
mm7	Amphibolite/Epidote Quartzite/Gneiss
mmll	Mafic hornfels
mp2	Gabbro
um	Undifferentiated Ultramafics
V4	Undifferentiated Metavolcanics
Ei	Irwinton Sand (Late Tertiary)

with azimuth over a long distance (>15 km), for a short distance (<2 km) this effect is negligible. Therefore, the wavefront W radiating from the blast will be at approximately the same distance r after a short time t in any direction Ø from the blast. To see this, we note that WDG lies approximately 1.99 km southwest of the blast site and that previous determinations of seismic velocities for areas of similar surface geology of the Piedmont Province in Georgia and South Carolina give PG velocities that lie within the range 5.5 to 6.3 km/sec while determinations of S wave velocities have suggested that these lie within the range 3.3 to 3.6 km/sec (Kean, 1978). If we assume the PG velocity varies with azimuth between 5.5 and 6.3 km/sec and compute the traveltime of the direct compressional wave from the blast site to WDG for both of these values, we get, for the lower velocity, a traveltime of 0.362 sec and, for the higher velocity, a traveltime of 0.316 sec. As will be shown later the difference between the traveltimes computed from these two extremes of PG velocity, 0.046 sec, is less than the accuracy of determination of PG arrival times from the least precise instrumentation used in the survey. A similar consideration for the S wave velocity extremes cited above gives a traveltime difference for S waves from the blast site to WDG of 0.050 sec and, as with PG waves, this value does not exceed the accuracy of determination of S wave arrival times at other stations used in the survey. Therefore, we can neglect this small difference and compute the origin time of each blast based on the arrival time of the PG and S waves at WDG assuming a velocity for each of these wave types that lies somewhere between the extremes cited above. It is felt that, in view of the aforementioned considerations, no significant error will be induced in the analysis of seismic velocities for the area as a result of this procedure.

The origin time of each blast has been computed by applying time correction factors to the PG and S wave arrival times at WDG. These factors were computed by means of the relation

$$D = (S-P)(1.37)(\alpha)$$

where α designates PG wave velocity, D denotes distance, and S-P represents the time differential between arrival of the P and S waves at WDG. This relation is derived below.

Let D be the distance from the origin of the seismic waves to the station in question. Let S and P represent the arrival times of S and P waves respectively at the station. It is easy to see that if α denotes P wave velocity and β denotes S wave velocity

$$D/\alpha = P \text{ and } D/\beta = S$$

Therefore,

$$S - P = D(1/\beta - 1/\alpha)$$

or,

$$D = (S-P)\ \beta\alpha/(\alpha-\beta)$$

$$D = (S-P)\alpha/(\alpha/\beta-1)$$

Now, if $\alpha/\beta = 1.732$, a generally good approximation for surface rock which will be discussed later, we get

$$D = (S-P)(\alpha)/0.732$$

$$D = (S-P)(1.37)(\alpha).$$

Now, S-P at WDG has been consistently observed at 0.25 sec and since WDG is 1.99 km distant from the blasts, we get $\alpha = 5.8$ km/sec. Using the relation

$$\beta = \alpha/1.732$$

we get $\beta = 3.35$ km/sec.

We stress here that these values of α and β are merely approximations determined from an empirical relation and are useful only as estimates of PG and S wave velocities for the purpose of computing origin times for the blasts based on the arrival times of seismic waves approximately 2 km from the blast site. Any error introduced by the use of these approximations for α and β over this short distance has already been shown to be negligible given the accuracy constraints of this survey.

Using $\alpha = 5.8$ km/sec and $\beta = 3.35$ km/sec, the traveltime for PG and S waves from the blast to WDG is 0.34 sec and 0.59 sec respectively. Thus, we have only to subtract 0.34 sec from the arrival time of the PG phase at WDG or 0.59 sec from the arrival time of the corresponding S phase to obtain the origin time of the blast. We should obtain the same value for the origin time whether 0.34 sec is subtracted from the PG arrival time or 0.59 sec is subtracted from the S arrival time and in fact, except for occasional variation due to round-off error, this is the case.

As already indicated, in addition to the four permanent seismometers, portable seismometers were placed at strategic locations in the area. The equipment at each of the permanent sites includes a Mark Products L4-C geophone with an amplifier and VCO. The signals are received at Georgia Tech via telephone data circuit transmission and recorded with pen and ink and on analog tape. The tape can then be played back at various speeds and recorded on paper for identification of various phase arrivals. The portable equipment included two Sprengnether MEQ 800 smoked paper recorders and one Geotech Teledyne Portacorder, also a smoked paper unit. A summary of the field equipment

used at each station is given in Table I. Station locations and distances from each station to the Wallace Dam Project blast site along a direct path to the source are given in Table II. Figure I shows the geometry of the station distribution.

Data

The data obtained are shown in Table III for four separate blasts. PG wave velocities (denoted α) and S wave velocities (denoted β) were computed to indivdual stations and it soon became obvious that no systematic variation in α or β with azimuth (θ) from the source is indicated by the observed data. The most plausible explanation for this observation, given the linearity of the geology in the area (see Figure II), is that while the velocity of both PG and S waves probably does vary with azimuth, this variation is less than the accuracy limits ($\pm$0.09 km/sec for PG waves, $\pm$0.06 km/sec for S waves) for this survey and thus not detectable.

Note that the data in Table III are from pen and ink recorders or smoked paper units. The estimated accuracy of reading arrival times for pen and ink records is $\pm$0.1 seconds using a 10X optical magnifier and a fine scale. The smoked paper records can be read somewhat more accurately at $\pm$0.05 seconds, also with optical magnification.

Table IV presents more accurate data from the magnetic tape. The recorded blasts were played back and recorded on the strip chart paper recorder at 125 mm/sec. It is felt that with the aid of optical magnification, one can measure the arrival of that which is taken as the PG or S phase arrival with a precision of 0.125 mm. However, this author feels that noise on the seismic trace which may be confused with the actual arrival of each phase causes the overall accuracy of phase determinations to be $\pm$0.01 sec for the data presented here.

The data were analyzed by linear regression. The results are given below. PG phase:

Direct compressional wave velocity (α) = (6.0$\pm$0.09)km/sec
Time - intercept (T) = (0.03$\pm$0.19) sec

S phase:
shear wave velocity (β) = (3.43$\pm$0.06) km/sec
Time - intercept = (0.01$\pm$0.39) sec

A reduced traveltime plot is shown in Figure IV.

Discussion

Cauchy's relation generally holds for rock. This relation is expressed by the equality

$\mu = \lambda$ where μ = shear modulus
λ = Lamé's Constant

Table I

Field Equipment

Station	Equipment
LS3	Sprengnether MEQ 800 smoked paper recorder with Mark L4-C 1 Hz geophone.
LS5	Geotech - Teledyne Portacorder (smoked paper) with Hall-Sears 1 Hz geophone.
LS6	Sprengnether MEQ 800 smoked paper recorder with Hall-Sears 1 Hz geophone.
GBG	Permanent station; Mark L4-C 1 Hz geophone, VCO board.
ETG	Permanent station; Mark L4-C 1 Hz geophone, VCO board.
REG	Permanent station; Mark L4-C 1 Hz geophone, VCO board.
WDG	Permanent station; Mark L4-C 1 Hz geophone, VCO board.

Table II

Distances from each station to the blast site and location of station.

Station	Distance (km)	Latitude	Longitude
ETG	19.15	33°17.472'N	83°21.042'W
GBG	17.23	33°29.954'N	83°12.670'W
REG	19.67	33°26.526'N	83°20.226'W
LS3	6.44	33°17.760'N	83°07.870'W
LS5	20.22	33°10.000'N	83°09.522'W
LS6	11.68	33°18.146'N	83°02.346'W

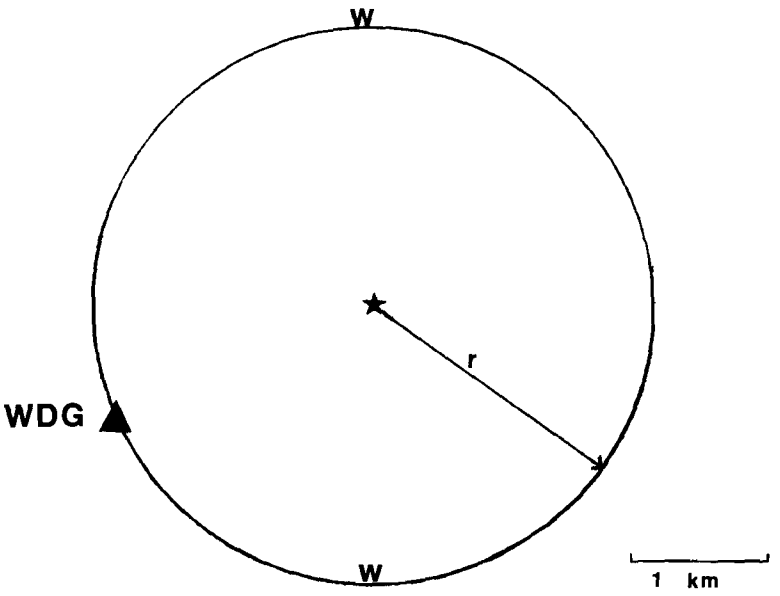


Figure III. The wavefront W radiating from the blast will be at approximately the same distance r for r<2 km after a short time t (t<0.6 sec) in any direction ø around the blast.

Table III

Data from Paper Records

Blast I. October 11, 1979 Origin Time = 57.41 sec

Station	Distance	PG arrival	S arrival	PG Δ time	S Δ time
ETG	19.15 km	60.65 sec	63.20 sec	3.24 ±0.1	5.74 ±0.1
REG	19.67	60.70	63.60	3.29 ±0.1	5.84 ±0.1

Blast II. October 17, 1979 Origin Time = 38.86 sec

Station	Distance	PG arrival	S arrival	PG Δ time	S Δ time
ETG	19.15 km	42.05 sec	44.35 sec	3.19 ±0.1	5.39 ±0.1
REG	19.67	42.15	44.70	3.29 ±0.1	5.84 ±0.1
LS3	6.44	39.95	40.75	1.09 ±0.05	1.89 ±0.05

Blast III. October 24, 1979 Origin Time = 28.26 sec

Station	Distance	PG arrival	S arrival	PG Δ time	S Δ time
ETG	19.15 km	31.50 sec	33.75 sec	3.24 ±0.1	5.49 ±0.1
GBG	17.23	31.20	33.30	2.94 ±0.1	5.04 ±0.1
REG	19.67	31.65	34.05	3.39 ±0.1	5.79 ±0.1
LS6	20.22	31.70	34.10	3.44 ±0.05	5.84 ±0.05
LS5	11.68	30.25	31.60	1.99 ±0.05	3.44 ±0.05

Blast IV. October 24, 1979 Origin Time = 34.11 sec

Station	Distance	PG arrival	S arrival	PG Δ time	S Δ time
ETG	19.15 km	37.25 sec	39.70 sec	3.14 ±0.1	5.59 ±0.1
GBG	17.23	37.05	39.20	2.94 ±0.1	5.09 ±0.1
LS6	20.22	37.55	39.85	3.44 ±0.05	5.84 ±0.05
LS5	11.68	36.10	37.45	1.99 ±0.05	3.39 ±0.05

Table IV

Tape Data

For PG phase:

Traveltime to REG =	3.26 ± .01 sec	Blast V
=	3.38 ± .01 sec	Blast VI
Traveltime to GBG =	2.90 ± .01 sec	Blast V
=	2.91 ± .01 sec	Blast VI

For S phase:

Traveltime to REG =	5.79 ± .01 sec	Blast V
	5.77 ± .01 sec	Blast VI
Traveltime to GBG =	5.03 ± .01 sec	Blast V
=	5.02 ± .01 sec	Blast VI

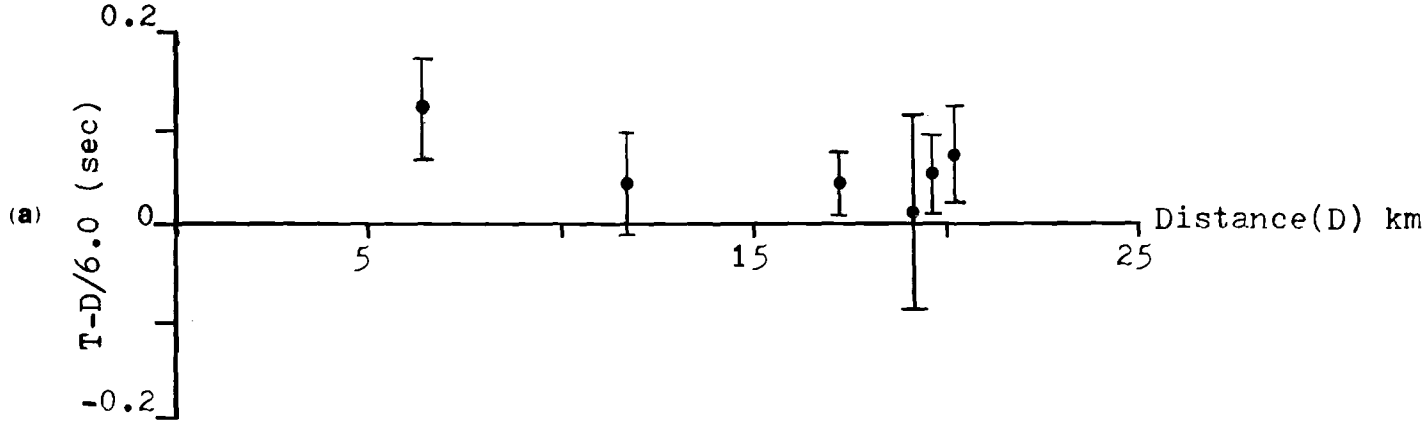
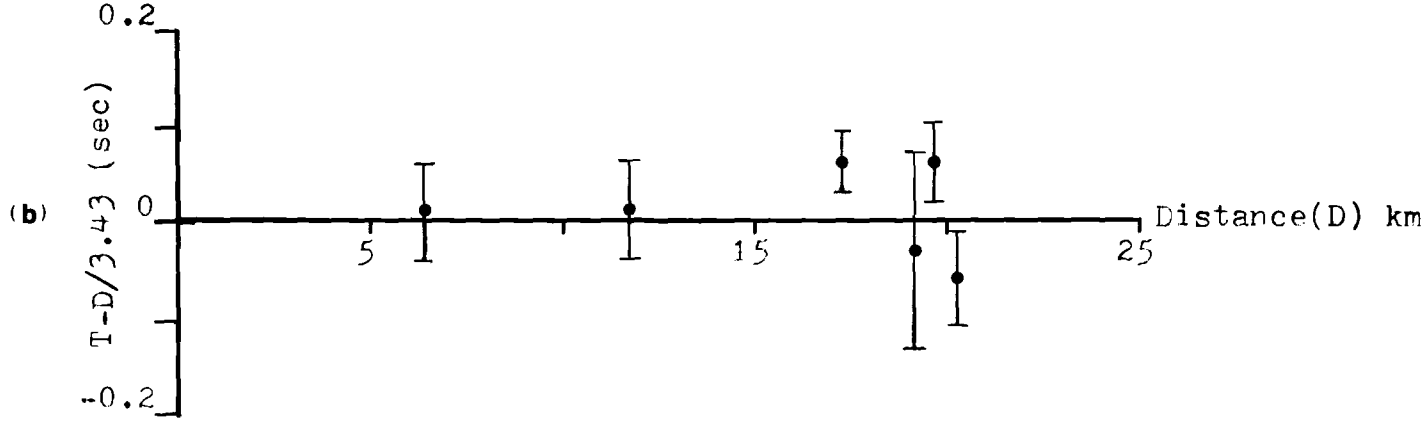


Figure IV Reduced traveltime plots of (a) PG phase and (b) S phase. Weighted mean values of the reduced traveltime observed at each distance are plotted. Vertical bars show maximum possible error for the weighted means.



The shear modulus is the ratio of shear stress to shear strain. Lamé's constant has no simple physical interpretation. As one might expect, geological parameters such as foliation, cleavage, and rock density vary to such an extent that Cauchy's relation cannot be regarded as being applicable to all geologic situations, it has, however been found to be valid in most geologic circumstances. Let us assume that it holds in the Wallace Dam area and make use of the expressions for α and β:

$$\alpha = \left(\frac{\lambda + \mu}{\rho}\right)^{1/2}$$

$$\beta = \left(\frac{\mu}{\rho}\right)^{1/2}$$

where α = compressional wave velocity
β = shear wave velocity
ρ = rock density

So, $\mu = \rho\beta^2$ and solving for α in terms of β gives

$$\alpha = 1.732\beta$$

Now, if Cauchy's relation does hold for the Wallace Dam area then the α and β we have computed from observed data should validate the expression

$$\alpha = 1.732\beta.$$

Our computed α = 6.00 km/sec, β = 3.43 km/sec gives

$$6.00/3.43 = 1.75$$

Given the accuracy constraints for the velocities determined, this ratio is well within the expected range for a Cauchy relation of $\mu = \lambda$.

Now, assuming ρ = 2.67 gm/cm^3 for the rock density in the Wallace Dam area, the relation for β gives

$$\mu = \beta^2\rho$$

$$\mu = (3.43 \times 10^5 \text{ cm/sec})^2 \ (2.67 \text{ gm/cm}^3)$$

$$\mu = 3.14 \times 10^{11} \text{ dynes/cm}^2$$

If we again make use of Cauchy's relation, the relations for the bulk modulus (K), Young's modulus (E), and Poisson's ratio (θ) give

$$K = \lambda + 2/3\ \mu$$

$K = 5/3\ \mu = 5.24 \times 10^{11}$ dynes/cm^2

$E = \mu(3\lambda + 2\mu)/(\lambda+\mu) = 5/2\ \mu$

$E = 7.85 \times 10^{11}$ dynes/cm^2

$\theta = \lambda/2(\lambda+\mu) = 0.25$

Conclusions

For the Wallace Dam area, the velocity of direct compressional waves and the velocity of shear waves appear to confirm a Cauchy relation of $\mu = \lambda$. The velocities and elastic modulii computed for the area using β and $= \lambda$ are:

compressional wave velocity (α) = 6.00 km/sec±0.09
shear wave velocity (β) = 3.43 km/sec ± 0.06
shear modulus (μ) = 3.14×10^{11} dynes/cm^2
bulk modulus (K) = 5.24×10^{11} dynes/cm^2
Young's modulus (E) = 7.85×10^{11} dynes/cm^2
Poisson's ratio (θ) = 0.25

Bibliography

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Pickering, S. M. and J. B. Murray (1976), Geologic Map of Georgia: Georgia Department of Natural Resources.

G-35-653

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Atlanta, Georgia 30332
(404) 894-2857

June 9, 1980

Mr. R. C. Thrasher
Georgia Power Company
P. O. Box 4545
Atlanta, Georgia 30302

Subject: Quarterly Letter Report Number 15, covering the period 1 March to 31 May 1980

Re: Seismic monitoring near Wallace Dam, Georgia

Dear Sir:

The total cumulative percentage recording coverage for the Wallace Dam net for the period March 1 to May 31, 1980 was 99.6%. This corresponds to a cumulative percentage of 98.7% for March, 100% for April, and 99.7% for May. The lost time was due to telephone communication system failures and recording pen problems. We define recording coverage for the Wallace Dam net as 100% when at least one station is recording noise free data. With 99.6% coverage there was 0.4% or only 3 hours during which an event could occur and not be detected.

In a previous report, Quarterly Letter Report 13, covering the period September 1 to November 30, 1977, we mentioned that we had recorded six seismic signatures originating from an area approximately nine kilometers northwest of Wallace Dam. At the time of their recording, we believed that they were blasts, based on the times of their occurrence and their almost constant magnitude. We noted in that report that we would be carefully observing future activity in that area. Beginning in March of this year several seismic signatures similar to those observed in Nobember 1979 have been recorded whose characteristics such as time of occurrence and variability of magnitude are typical of microearthquake activity. The first of these events occurred on March 18. On April 24, a "double event", with the first being followed at about 8 sec. by the second, was recorded. The WDG record of this event is shown in Figure 1. A swarm of eight microearthquakes at this locality began on May 1 and continued through May 3. Figure 2 shows the May 2-3 ETG recording of a number of these events.

Re-examination of the recordings of the anomalous signatures mentioned in the previous report indicates that they, too probably represent microearthquakes. Table I lists those events recorded from this locality during the period covered by this report. Table II lists those events occurring in the same locality which were recorded prior to this reporting period. Note that these events have not been formally reported before since they were believed to be blasts. Figure 3 shows all events that have thus far been recorded at this location.

Tables I and II show that the magnitudes of these events are rather low. The highest magnitude event recorded so far is 0.0 (based on duration of signal). Not enough data have been collected to determine whether these microearthquakes represent induced activity. However, a preponderance of low magnitude events frequently occurring in swarms is typical of reservoir-induced activity. We will continue to monitor the Lake Oconee area for signs of continued activity and changes in the character of these events.

Seismic activity in the Lake Sinclair area for this reporting period is tabulated in Table III. The areal distribution of these events is shown in Figure 4. As can be seen, only two microearthquakes were recorded in the Lake Sinclair area.

Figure 5 shows the cumulative distribution of all events thus far recorded by the Wallace Dam net.

During the past 9 months Jerry Allison has been developing a M.S. thesis on the topic of historical and recent seismicity in the Lake Sinclair vicinity. As part of that study he has relocated many of the events and accumulated new data on historical events. His thesis should be complete within two months and will be attached to the next appropriate letter report.

If you have any questions about this report, please do not hesitate to contact us directly.

Respectfully submitted,

Jerry Allison

Leland T. Long
Associate Professor

JA/dh

Figure 1. WDG recording of Lake Oconee "double" event, April 24.

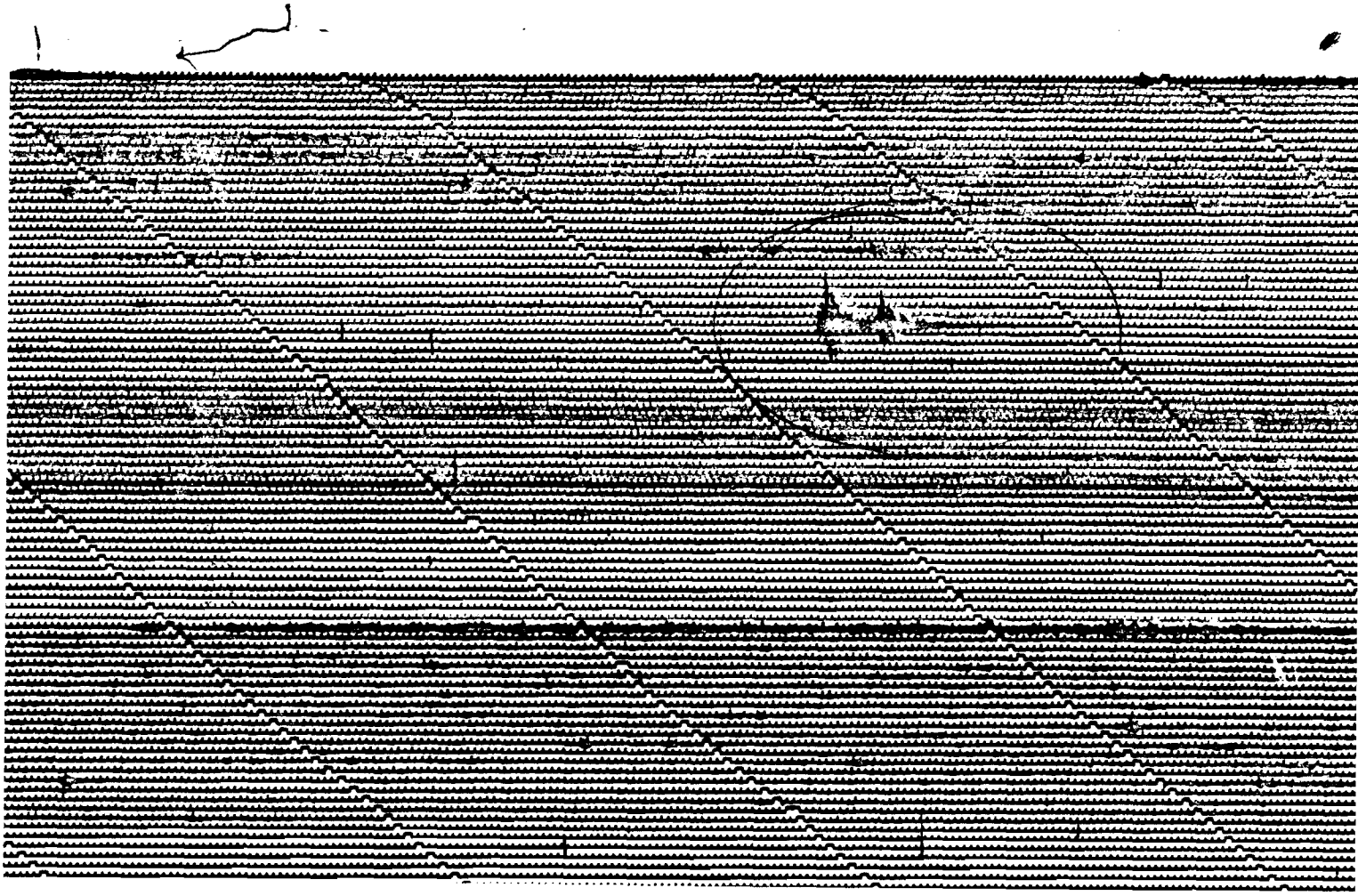


Figure 2. ETG recording of Lake Oconee events, May 2-3.

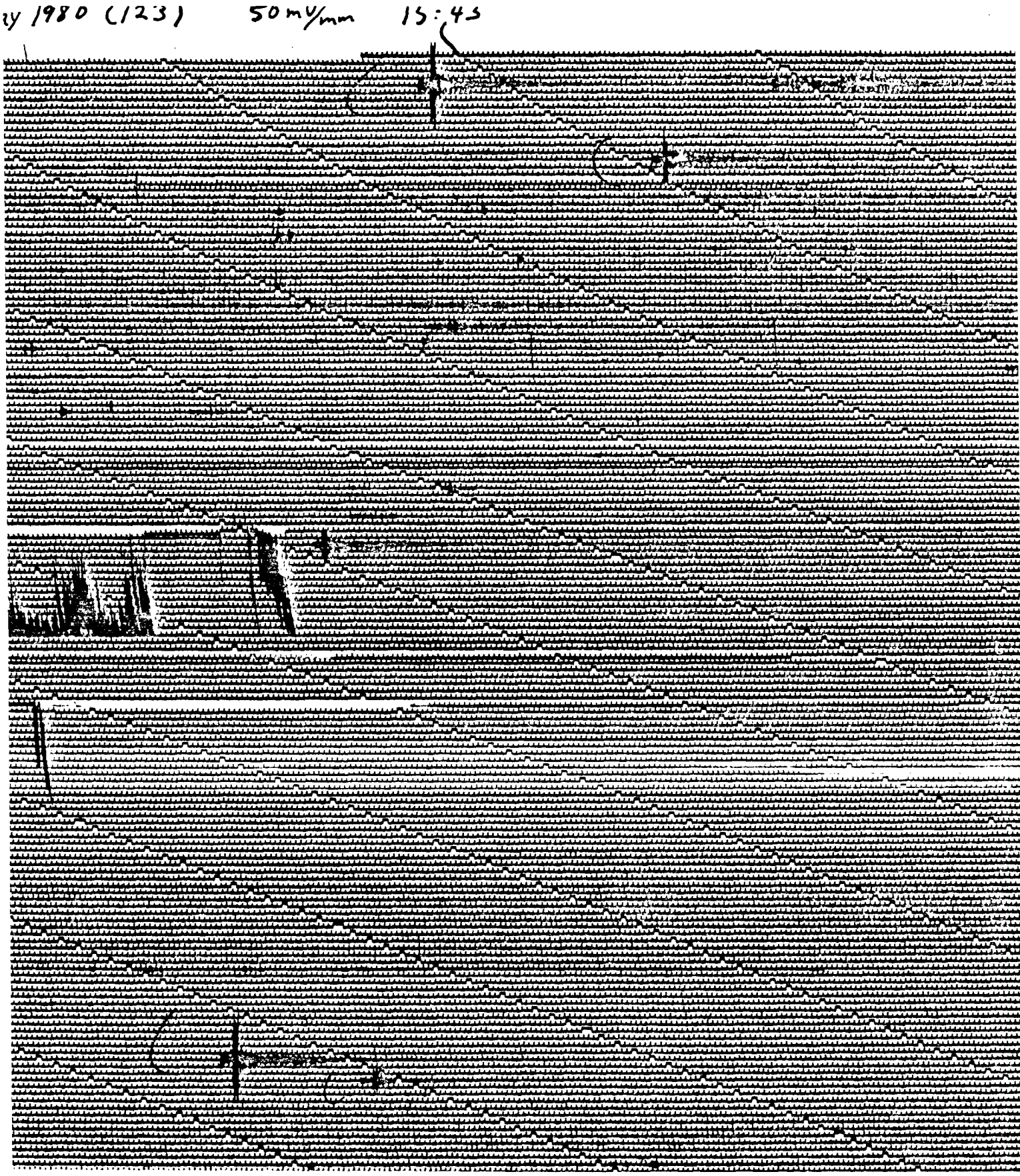


Table I. Microearthquakes recorded in the Lake Oconee area during the period of this report.

****

THE EVENT OCCURED ON MAR 18, 1980
AT ORIGIN TIME 7:23: 3.28 +/- .058
LAKE OCONEE EVENT
MAGNITUDE -0.3
THE WEIGHTS ARE
WX= 1.000 WY= 1.000 WZ= 0.000 WT= 1.000
IT WAS LOCATED AT
LATITUDE 33.4013 +/- .538 KM. (33D,24.08M)
LONGITUDE 83.1949 +/- .270 KM. (83D,11.70M)
DEPTH 1.00 +/- 0.000 KM.

STATION	PHASE	HR	MIN	SEC	+OR-SEC	DIST	AZ	OBS-THE
ETG	WPG	7	23	6.50	.10	18.95	229.9	.036
ETG	WSG-WPG	0	0	2.30	.10	18.95	229.9	-.048
GBG	WPG	7	23	5.10	.10	10.98	352.1	-.036
GBG	WSG-WPG	0	0	1.40	.10	10.98	352.1	.048

****

THE EVENT OCCURED ON APR 24, 1980
AT ORIGIN TIME 20:13:21.52 +/- .110
LAKE OCONEE EVENT
MAGNITUDE 0.0
THE WEIGHTS ARE
WX= 1.000 WY= 1.000 WZ= 0.000 WT= 1.000
IT WAS LOCATED AT
LATITUDE 33.3919 +/- .890 KM. (33D,23.51M)
LONGITUDE 83.1886 +/- .767 KM. (83D,11.31M)
DEPTH 1.00 +/- 0.000 KM.

STATION	PHASE	HR	MIN	SEC	+OR-SEC	DIST	AZ	OBS-THE
REG	WPG	20	13	24.10	.10	14.90	292.0	.069
REG	WSG-WPG	0	0	1.75	.10	14.90	292.0	-.092
WDG	WPG	20	13	22.45	.10	5.82	168.5	-.069
WDG	WSG-WPG	0	0	.80	.10	5.82	168.5	.092

****

THE EVENT OCCURED ON MAY 1, 1980
AT ORIGIN TIME 8: 8:49.21 +/- .058
LAKE OCONEE EVENT
MAGNITUDE 0.0
THE WEIGHTS ARE
WX= 1.000 WY= 1.000 WZ= 0.000 WT= 1.000
IT WAS LOCATED AT
LATITUDE 33.3930 +/- .320 KM. (33D,23.58M)
LONGITUDE 83.1920 +/- .336 KM. (83D,11.52M)
DEPTH 1.00 +/- 0.000 KM.

STATION	PHASE	HR	MIN	SEC	+OR-SEC	DIST	AZ	OBS-THE
ETG	WPG	8	8	52.30	.10	18.58	232.6	-.036
ETG	WSG-WPG	0	0	2.35	.10	18.58	232.6	.048
REG	WPG	8	8	51.70	.10	14.55	292.0	.036
REG	WSG-WPG	0	0	1.75	.10	14.55	292.0	-.048

****

THE EVENT OCCURED ON MAY 2, 1980
AT ORIGIN TIME 9:56:43.34 +/- .076
LAKE OCONEE EVENT
MAGNITUDE -0.2
THE WEIGHTS ARE
WX= 1.000 WY= 1.000 WZ= 0.000 WT= 1.000
IT WAS LOCATED AT
LATITUDE 33.4017 +/- .496 KM. (33D,24.10M)
LONGITUDE 83.1889 +/- .370 KM. (83D,11.33M)
DEPTH 1.00 +/- 0.000 KM.

STATION	PHASE	HR	MIN	SEC	+OR-SEC	DIST	AZ	OBS-THE
ETG	WPG	9	56	46.60	.10	19.40	230.9	-.004
ETG	WSG-WPG	0	0	2.30	.10	19.40	230.9	-.104
GBG	WPG	9	56	45.10	.10	11.04	349.2	-.110
GBG	WSG-WPG	0	0	1.40	.10	11.04	349.2	.041
REG	WPG	9	56	45.90	.10	14.50	288.0	.114
REG	WSG-WPG	0	0	1.75	.10	14.50	288.0	-.041

****

THE EVENT OCCURED ON MAY 2, 1980
AT ORIGIN TIME 10:24:59.17 +/- .068
LAKE OCONEE EVENT
MAGNITUDE 0.0
THE WEIGHTS ARE
WX= 1.000 WY= 1.000 WZ= 0.000 WT= 1.000
IT WAS LOCATED AT
LATITUDE 33.4044 +/- .446 KM. (33D,24.26M)
LONGITUDE 83.1911 +/- .330 KM. (83D,11.46M)
DEPTH 1.00 +/- 0.000 KM.

STATION	PHASE	HR	MIN	SEC	+OR-SEC	DIST	AZ	OBS-THE
ETG	WPG	10	25	2.50	.10	19.44	229.8	.057
ETG	WSG-WPG	0	0	2.30	.10	19.44	229.8	-.109
GBG	WPG	10	25	.90	.10	10.70	349.9	-.086
GBG	WSG-WPG	0	0	1.40	.10	10.70	349.9	.083
REG	WPG	10	25	1.60	.10	14.21	287.1	.029
REG	WSG-WPG	0	0	1.75	.10	14.21	287.1	-.006

****

THE EVENT OCCURED ON MAY 2, 1980
AT ORIGIN TIME 10:30:47.63 +/- .034
LAKE OCONEE EVENT
MAGNITUDE 0.0
THE WEIGHTS ARE
WX= 1.000 WY= 1.000 WZ= 0.000 WT= 1.000
IT WAS LOCATED AT
LATITUDE 33.3984 +/- .221 KM. (33D,23.90M)
LONGITUDE 83.1924 +/- .164 KM. (83D,11.54M)
DEPTH 1.00 +/- 0.000 KM.

STATION	PHASE	HR	MIN	SEC	+OR-SEC	DIST	AZ	OBS-THE
ETG	WPG	10	30	50.80	.10	18.93	231.1	-.012
ETG	WSG-WPG	0	0	2.30	.10	18.93	231.1	-.045
GBG	WPG	10	30	49.50	.10	11.34	351.1	-.046
GBG	WSG-WPG	0	0	1.40	.10	11.34	351.1	.003
REG	WPG	10	30	50.10	.10	14.31	289.8	.058
REG	WSG-WPG	0	0	1.75	.10	14.31	289.8	-.018

****

THE EVENT OCCURED ON MAY 2, 1980
AT ORIGIN TIME 16:14:40.48 +/- .055
LAKE OCONEE EVENT
MAGNITUDE 0.1
THE WEIGHTS ARE
WX= 1.000 WY= 1.000 WZ= 0.000 WT= 1.000
IT WAS LOCATED AT
LATITUDE 33.4000 +/- .356 KM. (33D,24.00M)
LONGITUDE 83.1906 +/- .265 KM. (83D,11.44M)
DEPTH 1.00 +/- 0.000 KM.

STATION	PHASE	HR	MIN	SEC	+OR-SEC	DIST	AZ	OBS-THE
ETG	WPG	16	14	43.70	.10	19.17	231.0	-.008
ETG	WSG-WPG	0	0	2.30	.10	19.17	231.0	-.075
GBG	WPG	16	14	42.30	.10	11.19	350.2	-.078
GBG	WSG-WPG	0	0	1.40	.10	11.19	350.2	.022
REG	WPG	16	14	43.00	.10	14.40	289.9	.086
REG	WSG-WPG	0	0	1.75	.10	14.40	289.9	-.070

****

THE EVENT OCCURED ON MAY 2, 1980
AT ORIGIN TIME 17:35: 2.54 +/- .060
LAKE OCONEE EVENT
MAGNITUDE 0.0
THE WEIGHTS ARE
WX= 1.000 WY= 1.000 WZ= 0.000 WT= 1.000
IT WAS LOCATED AT
LATITUDE 33.3978 +/- .391 KM. (33D,23.87M)
LONGITUDE 83.1905 +/- .292 KM. (83D,11.43M)
DEPTH 1.00 +/- 0.000 KM.

STATION	PHASE	HR	MIN	SEC	+OR-SEC	DIST	AZ	OBS-THE
ETG	WPG	17	35	5.70	.10	19.02	231.6	-.040
ETG	WSG-WPG	0	0	2.30	.10	19.02	231.6	-.057
GBG	WPG	17	35	4.40	.10	11.43	350.3	-.074
GBG	WSG-WPG	0	0	1.40	.10	11.43	350.3	-.008
REG	WPG	17	35	5.10	.10	14.50	289.8	.114
REG	WSG-WPG	0	0	1.75	.10	14.50	289.8	-.042

****

THE EVENT OCCURED ON MAY 3, 1980
AT ORIGIN TIME 10:30:32.50 +/- .080
LAKE OCONEE EVENT
MAGNITUDE 0.0
THE WEIGHTS ARE
WX= 1.000 WY= 1.000 WZ= 0.000 WT= 1.000
IT WAS LOCATED AT
LATITUDE 33.3994 +/- .515 KM. (33D,23.97M)
LONGITUDE 83.1888 +/- .385 KM. (83D,11.33M)
DEPTH 1.00 +/- 0.000 KM.

STATION	PHASE	HR	MIN	SEC	+OR-SEC	DIST	AZ	OBS-THE
ETG	WPG	10	30	35.70	.10	19.26	231.5	-.036
ETG	WSG-WPG	0	0	2.30	.10	19.26	231.5	-.087
GBG	WPG	10	30	34.30	.10	11.28	349.3	-.106
GBG	WSG-WPG	0	0	1.40	.10	11.28	349.3	.010
REG	WPG	10	30	35.10	.10	14.59	288.9	.142
REG	WSG-WPG	0	0	1.75	.10	14.59	288.9	-.053

****

THE EVENT OCCURED ON MAY 3, 1980
AT ORIGIN TIME 10:54:49.77 +/- .037
LAKE OCONEE EVENT
MAGNITUDE -0.1
THE WEIGHTS ARE
WX= 1.000 WY= 1.000 WZ= 0.000 WT= 1.000
IT WAS LOCATED AT
LATITUDE 33.4006 +/- .239 KM. (33D,24.04M)
LONGITUDE 83.1926 +/- .178 KM. (83D,11.55M)
DEPTH 1.00 +/- 0.000 KM.

STATION	PHASE	HR	MIN	SEC	+OR-SEC	DIST	AZ	OBS-THE
ETG	WPG	10	54	53.00	.10	19.07	230.5	.021
ETG	WSG-WPG	0	0	2.30	.10	19.07	230.5	-.062
GBG	WPG	10	54	51.60	.10	11.09	351.0	-.050
GBG	WSG-WPG	0	0	1.40	.10	11.09	351.0	.034
REG	WPG	10	54	52.20	.10	14.21	288.9	.030
REG	WSG-WPG	0	0	1.75	.10	14.21	288.9	-.006

****

THE EVENT OCCURED ON MAY 5, 1980
AT ORIGIN TIME 18:17: 5.38 +/- .055
LAKE OCONEE EVENT
MAGNITUDE -0.3
THE WEIGHTS ARE
WX= 1.000 WY= 1.000 WZ= 0.000 WT= 1.000
IT WAS LOCATED AT
LATITUDE 33.4000 +/- .356 KM. (33D,24.00M)
LONGITUDE 83.1906 +/- .265 KM. (83D,11.44M)
DEPTH 1.00 +/- 0.000 KM.

STATION	PHASE	HR	MIN	SEC	+OR-SEC	DIST	AZ	OBS-THE
ETG	WPG	18	17	8.60	.10	19.17	231.0	-.008
ETG	WSG-WPG	0	0	2.30	.10	19.17	231.0	-.075
GBG	WPG	18	17	7.20	.10	11.19	350.2	-.078
GBG	WSG-WPG	0	0	1.40	.10	11.19	350.2	.022
REG	WPG	18	17	7.90	.10	14.40	288.9	.086
REG	WSG-WPG	0	0	1.75	.10	14.40	288.9	-.030

Table II. Microearthquakes recorded in the Lake Oconee area prior to the period of this report.

****

THE EVENT OCCURED ON OCT 15, 1979
AT ORIGIN TIME 5:17:54.62 +/- .045
LAKE OCONEE EVENT
MAGNITUDE -0.2
THE WEIGHTS ARE
WX= 1.000 WY= 1.000 WZ= 0.000 WT= 1.000
IT WAS LOCATED AT
LATITUDE 33.3990 +/- .261 KM. (33D,23.94M)
LONGITUDE 83.1973 +/- .263 KM. (83D,11.84M)
DEPTH 1.00 +/- 0.000 KM.

STATION	PHASE	HR	MIN	SEC	+OR-SEC	DIST	AZ	OBS-THE
ETG	WPG	5	17	57.80	.10	18.62	230.1	.045
ETG	WSG-WPG	0	0	2.30	.10	18.62	230.1	-.006
REG	WPG	5	17	56.90	.10	13.86	290.2	-.061
REG	WSG-WPG	0	0	1.75	.20	13.86	290.2	.039
WDG	WPG	5	17	55.80	.10	6.79	163.1	.016
WDG	WSG-WPG	0	0	.75	.10	6.79	163.1	-.080

THE EVENT OCCURED ON OCT 22, 1979
AT ORIGIN TIME 14:47:29.64 +/- .060
LAKE OCONEE EVENT
MAGNITUDE -0.1
THE WEIGHTS ARE
WX= 1.000 WY= 1.000 WZ= 0.000 WT= 1.000
IT WAS LOCATED AT
LATITUDE 33.4049 +/- .464 KM. (33D,24.30M)
LONGITUDE 83.1919 +/- .314 KM. (83D,11.52M)
DEPTH 1.00 +/- 0.000 KM.

STATION	PHASE	HR	MIN	SEC	+OR-SEC	DIST	AZ	OBS-THE
ETG	WPG	14	47	32.87	.10	19.42	229.5	-.039
ETG	WSG-WPG	0	0	2.35	.10	19.42	229.5	-.056
GBG	WPG	14	47	31.30	.10	10.63	350.3	-.144
GBG	WSG-WPG	0	0	1.40	.10	10.63	350.3	.092
REG	WPG	14	47	32.10	.10	14.12	287.0	.074
REG	WSG-WPG	0	0	1.75	.10	14.12	287.0	.006
WDG	WPG	14	47	31.00	.10	7.31	168.4	.109
WDG	WSG-WPG	0	0	.75	.10	7.31	168.4	-.143

****

THE EVENT OCCURED ON NOV 8, 1979
AT ORIGIN TIME 5: 8:48.55 +/- .034
LAKE OCONEE EVENT
MAGNITUDE 0.0
THE WEIGHTS ARE
WX= 1.000 WY= 1.000 WZ= 0.000 WT= 1.000
IT WAS LOCATED AT
LATITUDE 33.3997 +/- .221 KM. (33D,23.98M)
LONGITUDE 83.1926 +/- .164 KM. (83D,11.56M)
DEPTH 1.00 +/- 0.000 KM.

STATION	PHASE	HR	MIN	SEC	+OR-SEC	DIST	AZ	OBS-THE
ETG	WPG	5	8	51.75	.10	19.00	230.7	.001
ETG	WSG-WPG	0	0	2.30	.10	19.00	230.7	-.054
GBG	WPG	5	8	50.40	.10	11.19	351.1	-.046
GBG	WSG-WPG	0	0	1.40	.20	11.19	351.1	.022
REG	WPG	5	8	51.00	.10	14.24	289.3	.045
REG	WSG-WPG	0	0	1.75	.10	14.24	289.3	-.009

****

THE EVENT OCCURED ON NOV 14, 1979
AT ORIGIN TIME 9: 1:35.23 +/- .060
LAKE OCONEE EVENT
MAGNITUDE -0.2
THE WEIGHTS ARE
WX= 1.000 WY= 1.000 WZ= 0.000 WT= 1.000
IT WAS LOCATED AT
LATITUDE 33.3957 +/- .363 KM. (33D,23.74M)
LONGITUDE 83.1883 +/- .305 KM. (83D,11.30M)
DEPTH 1.00 +/- 0.000 KM.

STATION	PHASE	HR	MIN	SEC	+OR-SEC	DIST	AZ	OBS-THE
ETG	WPG	9	1	38.55	.10	19.04	232.6	.118
ETG	WSG-WPG	0	0	2.30	.10	19.04	232.6	-.059
GBG	WSG-WPG	0	0	1.40	.10	11.70	349.5	-.042
REG	WPG	9	1	37.70	.10	14.77	290.4	-.021
REG	WSG-WPG	0	0	1.75	.10	14.77	290.4	-.075
WDG	WPG	9	1	36.20	.10	6.23	169.5	-.098
WDG	WSG-WPG	0	0	.75	.10	6.23	169.5	-.009

****

THE EVENT OCCURED ON DEC 12, 1979
AT ORIGIN TIME 20:13:32.66 +/- .094
LAKE OCONEE EVENT
MAGNITUDE 0.0
THE WEIGHTS ARE
WX= 1.000 WY= 1.000 WZ= 0.000 WT= 1.000
IT WAS LOCATED AT
LATITUDE 33.3995 +/- .848 KM. (33D,23.97M)
LONGITUDE 83.1755 +/- .487 KM. (83D,10.53M)
DEPTH 1.00 +/- 0.000 KM.

STATION	PHASE	HR	MIN	SEC	+OR-SEC	DIST	AZ	OBS-THE
GBG	WPG	20	13	34.50	.10	11.57	343.3	-.112
GBG	WSG-WPG	0	0	1.40	.10	11.57	343.3	-.025
REG	WPG	20	13	35.50	.10	15.76	287.5	.189
REG	WSG-WPG	0	0	1.75	.10	15.76	287.5	-.199
WDG	WPG	20	13	33.70	.10	6.55	180.5	-.077
WDG	WSG-WPG	0	0	.75	.10	6.55	180.5	-.049

Figure 3. Lake Oconee events.

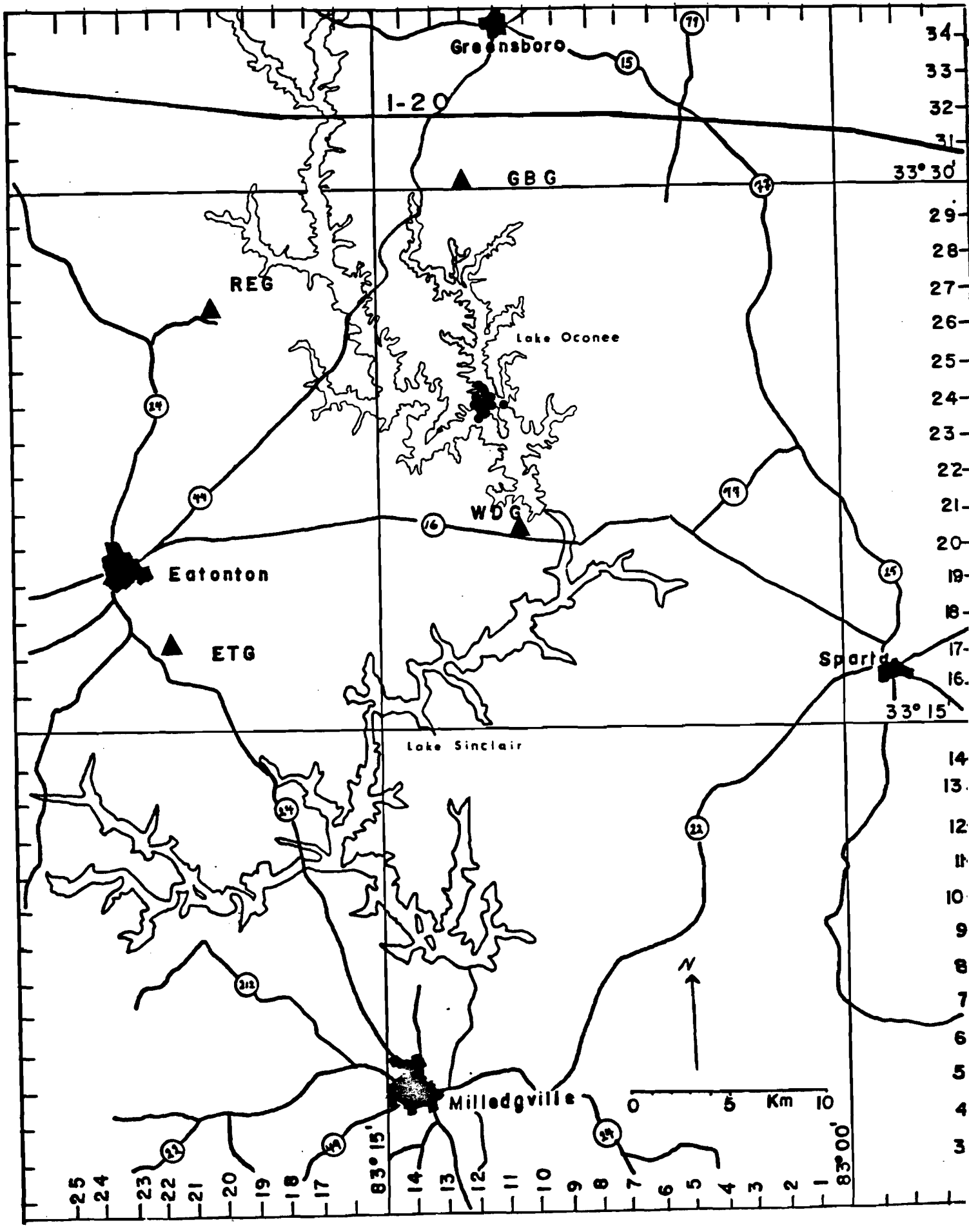


Table III. Microearthquakes recorded in the Lake Sinclair area during the period of this report.

THE EVENT OCCURED ON MAR 30, 1980
AT ORIGIN TIME 18:16: 1.76 +/- .100
LAKE SINCLAIR EVENT
MAGNITUDE -0.5
THE WEIGHTS ARE
WX= 1.000 WY= 1.000 WZ= 0.000 WT= 1.000
IT WAS LOCATED AT
LATITUDE 33.2130 +/- .726 KM. (33D,12.78M)
LONGITUDE 83.2806 +/- .560 KM. (83D,16.83M)
DEPTH 1.00 +/- 0.000 KM.

STATION	PHASE	HR	MIN	SEC	+OR-SEC	DIST	AZ	OBS-THE
ETG	WPG	18	16	3.70	.10	10.86	323.0	.102
ETG	WSG-WPG	0	0	1.28	.10	10.86	323.0	-.057
GBG	WPG	18	16	7.20	.10	32.41	11.5	.010
GBG	WSG-WPG	0	0	4.10	.10	32.41	11.5	.072
REG	WPG	18	16	6.00	.10	25.95	348.3	-.112

****

THE EVENT OCCURED ON APR 27, 1980
AT ORIGIN TIME 1:20:56.36 +/- .395
LAKE SINCLAIR EVENT
MAGNITUDE 0.1
THE WEIGHTS ARE
WX= 1.000 WY= 1.000 WZ= 0.000 WT= 1.000
IT WAS LOCATED AT
LATITUDE 33.1870 +/- 2.928 KM. (33D,11.22M)
LONGITUDE 83.3230 +/- 1.890 KM. (83D,19.38M)
DEPTH 1.00 +/- 0.000 KM.

STATION	PHASE	HR	MIN	SEC	+OR-SEC	DIST	AZ	OBS-THE
ETG	WPG	1	20	58.10	.10	11.84	347.4	-.267
ETG	WSG-WPG	0	0	2.00	.10	11.84	347.4	.540
REG	WSG-WPG	0	0	3.30	.10	28.32	357.3	-.217
WDG	WPG	1	21	.30	.10	21.84	38.8	.267
WDG	WSG-WPG	0	0	2.40	.10	21.84	38.8	-.308

Figure 4. Lake Sinclair events.

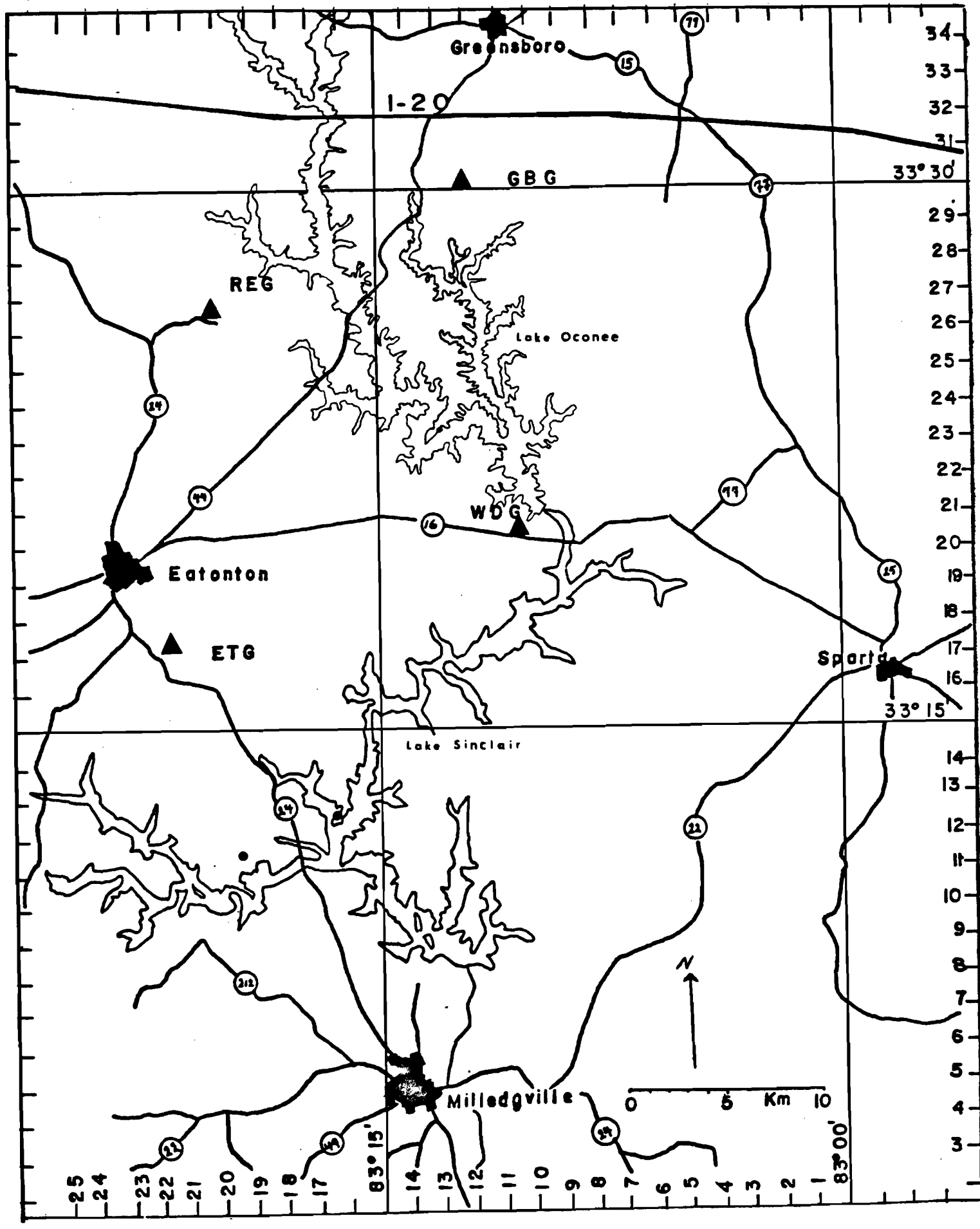
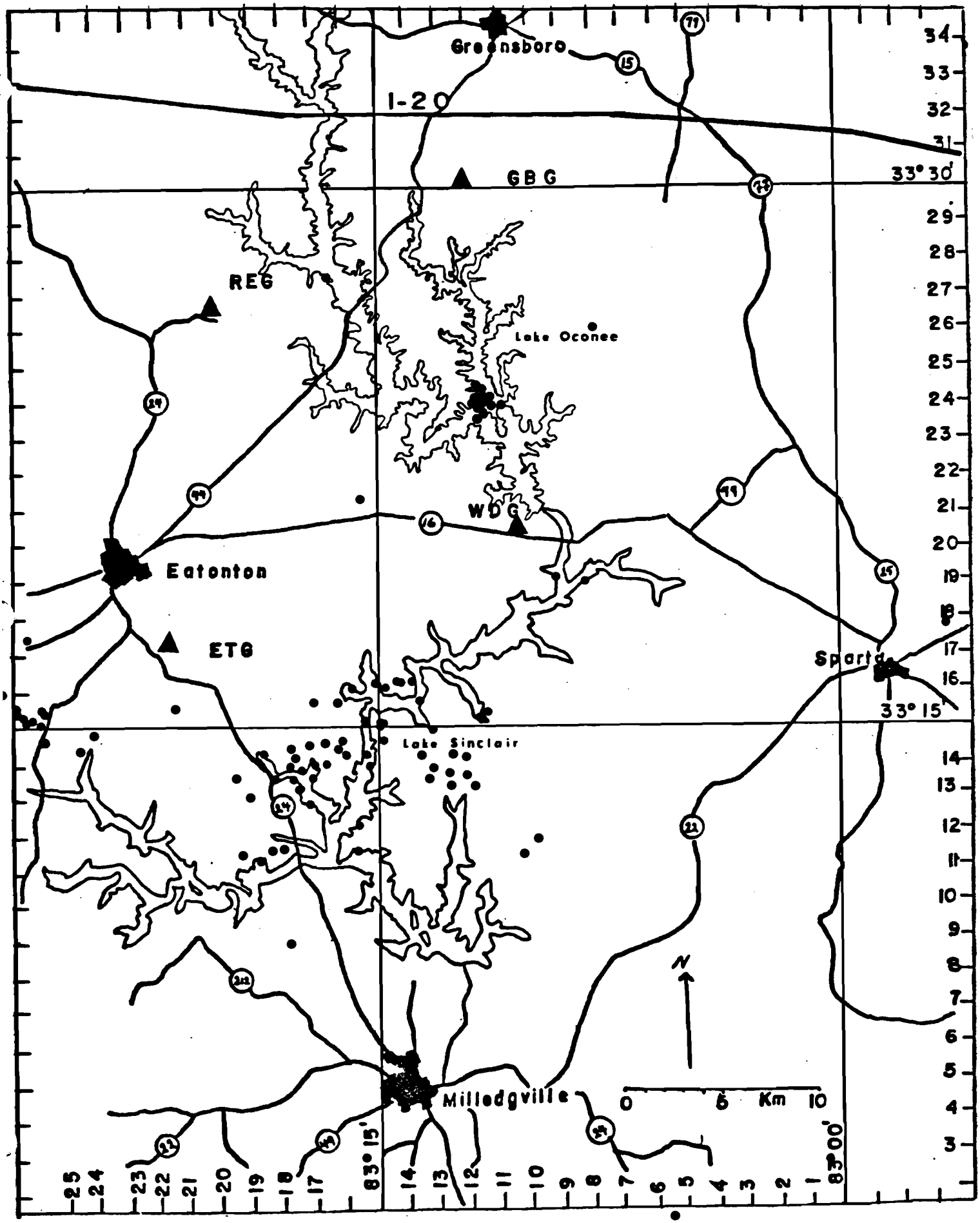


FIGURE V


Greensboro
I-20
GBG
33° 30'
REG
Lake Oconee
WDG
Eatonton
ETG
Sparta
33° 15'
Lake Sinclair
Milledgville
N
0 5 Km 10
83° 15'
83° 00'

G-35-653

GEORGIA INSTITUTE OF TECHNOLOGY
SCHOOL OF GEOPHYSICAL SCIENCES
Atlanta, Georgia 30332
(404) 894-2857

October 6, 1980

Mr. R. C. Thrasher
Georgia Power Company
P. O. Box 4545
Atlanta, Georgia 30302

Subject: Quarterly letter report No. 16, covering the period 1 June to 31 August 1980.

Re: Seismic monitoring near Wallace Dam, Georgia

Dear Sir:

The total cumulative percentage recording coverage for the Wallace Dam net for the period of 1 June to 31 August, 1980 was 82%. This corresponds to a cumulative percentage of 84, 96, and 65 for the months of June, July and August, respectively.

The especially poor coverage in August was mainly due to lightening strikes and telephone communication system failures. A lot of attention was made to repair the damaged systems as soon as possible.

Five local events were recorded during July and August. No activity was noticed in June. The most significant events occurred on July 22. An event of magnitude 1.0 was followed by an aftershock of magnitude 0.0 in the Lake Sinclair area.

The other important signature was the one on August 4, 1980 which was followed by two well recorded aftershocks. These also have been attributed to Lake Sinclair activity, and occurred in the same area as the previous ones.

Another event occurring on August 6 did not follow the previous as far as location is concerned. Since it was located in the far northeastern extreme of Lake Sinclair, somewhat near Lake Oconee, but with a different type wave form from Lake Oconee events recorded on April 24 and May 2-3 as were described in the last report.

The last natural event occurred on August 8, 1980, but due to lack of information (recorded on two stations in the network) it was not located. It was also attributed to Lake Sinclair activity.

This report contains information regarding the seismic activity recorded and located during the period of this report, given in Table I. Figures 1-5 shows the type of waveform encountered represented in a characteristic seismogram. Figure 6 presents the locations of these events. Finally the cumulative distribution of all events thus far recorded in both Lake Sinclair and Lake Oconee is shown in Figure 7.

During the period of this report, there have been no noticable activity in Lake Oconee.

Respectfully submitted,

Nabil I. Al-Alusi

Leland T. Long
Associate Professor

LTL/dh

Table I. Microearthquakes recorded in the lake sinclair area during the period of this report.

AREA	ID NO.	DATE	ORIGIN TIME	LATITUDE	LONGITUDE	DEPTH	MAGNITU
		LAKE SINCLAIR 22-7-80					
WDF	47	80/07/22	07:42:24.26C	33.2576	83.2183	0.00C	1.0
		REG PLG	07:42: 28.750		+/- .100		
		REG SLG-PLG	00:00: 3.200		+/- .100		
		ETG PLG	07:42: 26.975		+/- .100		
		LTG SLG-PLG	00:00: 2.000		+/- .100		
		GBG PLG	07:42: 29.260		+/- .100		
		GBG SLG-PLG	00:00: 3.625		+/- .100		
		LAKE SINCLAIR 22-7-80					
WDF	73	80/07/22	07:48:11.40C	33.2558	83.2022	0.00C	0.0
		ETG PG	07:48: 13.875		+/- .100		
		ETG S	07:48: 15.875		+/- .100		
		WDG PG	07:48: 14.100		+/- .100		
		WDG S	07:48: 16.025		+/- .100		
		REG PLG	07:48: 16.200		+/- .100		
		REG SLG	07:48: 19.400		+/- .100		
		LAKE SINCLAIR 4-8-80					
WDF	44	80/08/04	09:09: 7.59	33.2738	83.2836	0.00C	1.0
		GBG PLG	09:09: 12.250		+/- .100		
		GBG SLG	09:09: 16.000		+/- .100		
		GBG SLG-PLG	00:00: 3.750		+/- .100		
		REG PLG	09:09: 11.250		+/- .100		
		REG SLG	09:09: 14.250		+/- .100		
		REG SLG-PLG	00:00: 3.000		+/- .100		
		WDG PG	09:09: 10.500		+/- .100		
		WDG S	09:09: 12.750		+/- .100		
		WDG S-P	00:00: 2.250		+/- .100		
		LAKE SINCLAIR 6-8-80					
WDF	74	80/08/06	03:32: 4.23	33.3608	83.1366	0.00C	0.0
		ETG PLG	03:32: 8.250		+/- .100		
		ETG SLG	03:32: 11.500		+/- .100		
		ETG SLG-PLG	00:00: 3.250		+/- .100		
		REG PLG	03:32: 7.900		+/- .100		
		REG SLG	03:32: 10.900		+/- .100		
		REG SLG-PLG	00:00: 3.000		+/- .100		
		GBG PG	03:32: 7.200		+/- .100		
		GBG S	03:32: 9.700		+/- .100		
		GBG S-P	00:00: 2.500		+/- .100		
		LAKE SINCAIR 6-8-80					
WDF	75	80/08/06	03:34:21.61	33.3573	83.1233	0.00C	0.0
		ETG PLG	03:34: 25.800		+/- .100		
		ETG SLG	03:34: 29.050		+/- .100		
		GBG PG	03:34: 24.750		+/- .100		
		GBG S	03:34: 27.250		+/- .100		

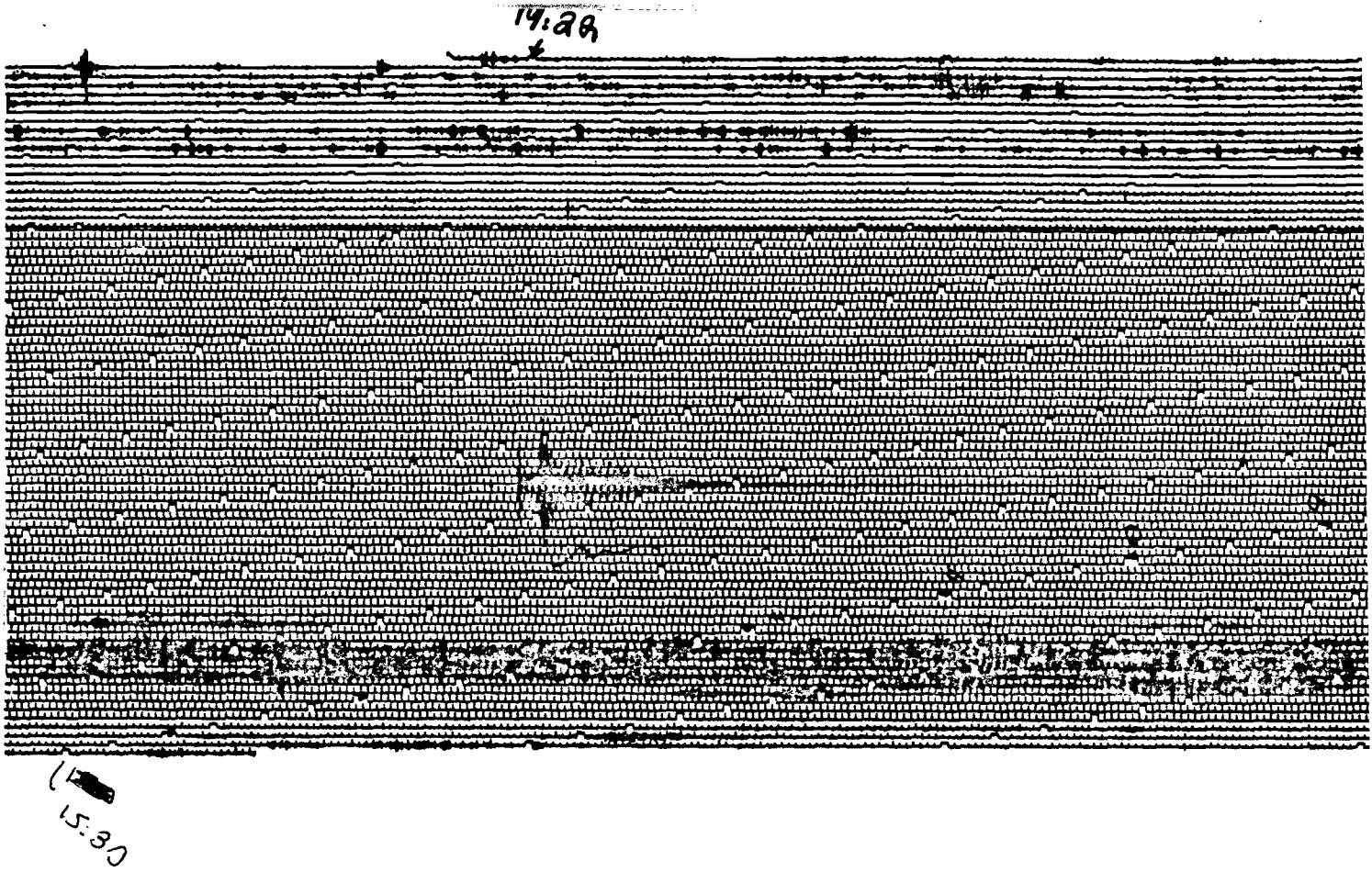


Figure 1. REG recording of lake sinclair's main-event, july 22 (ID NO. 47).

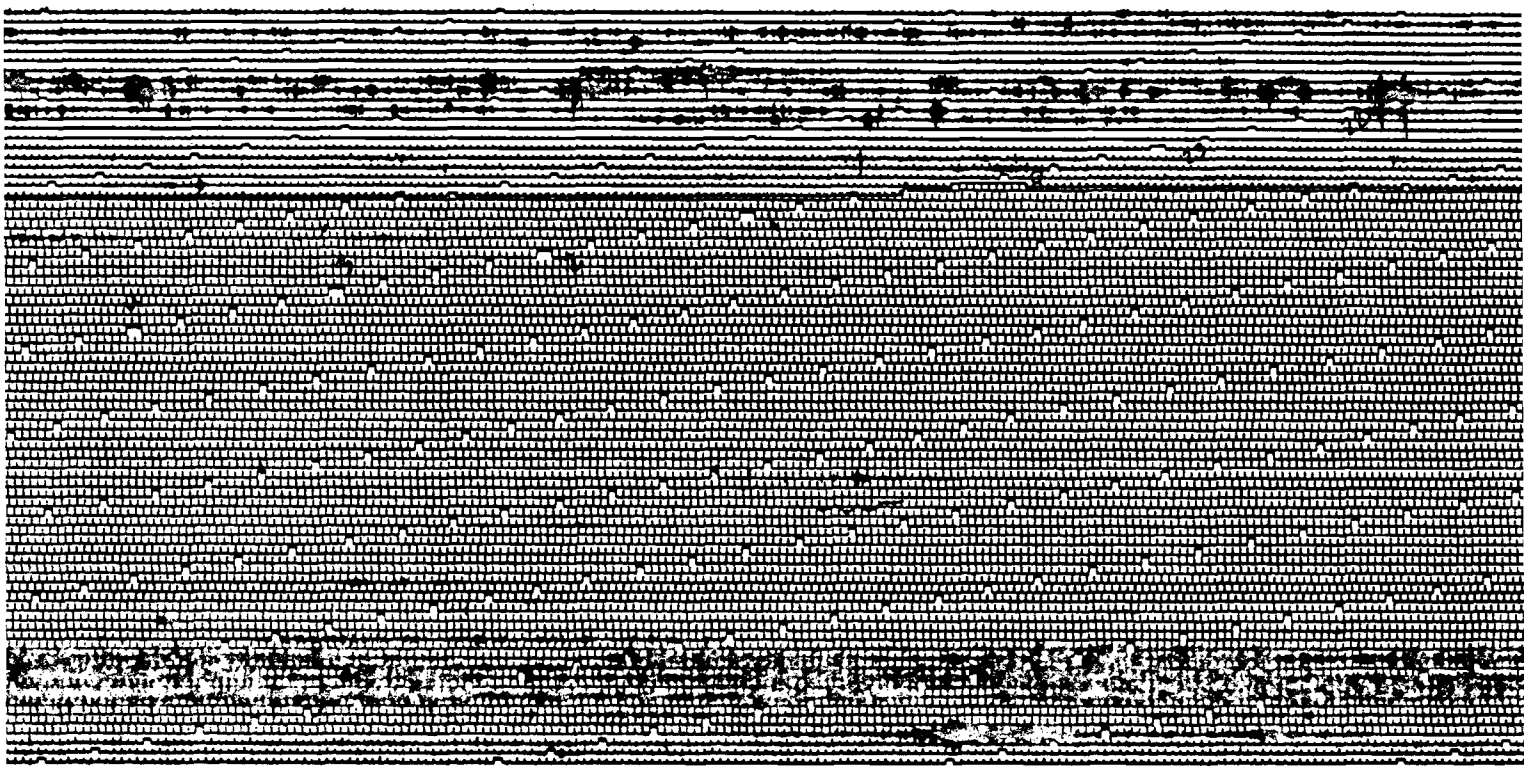


Figure 2. REG recording of lake sinclair's aftershock, July 22 (ID NO. 73).

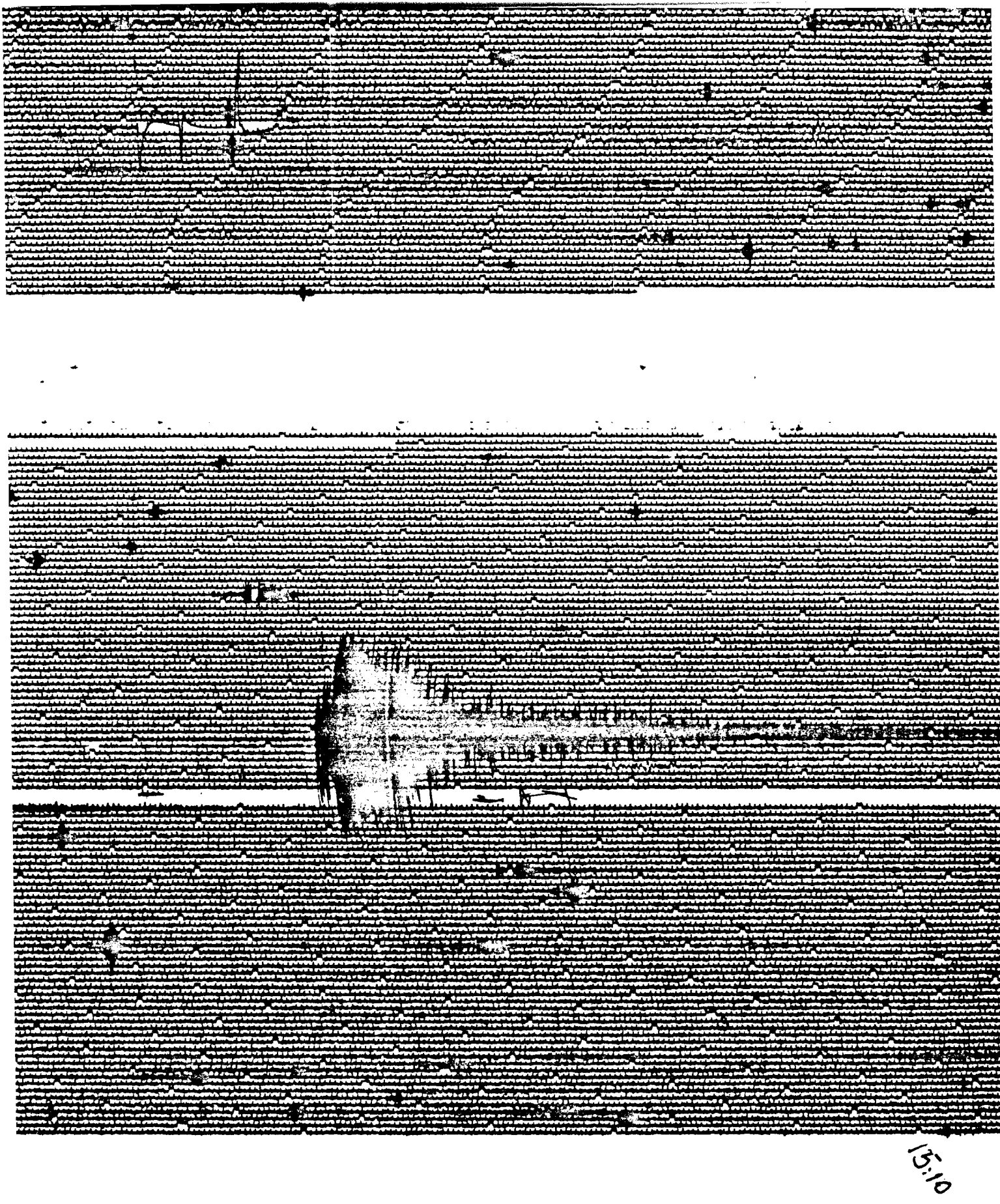


Figure 3. GBG recording of Lake sinclair's main-event(m_b=2.0), August 4.

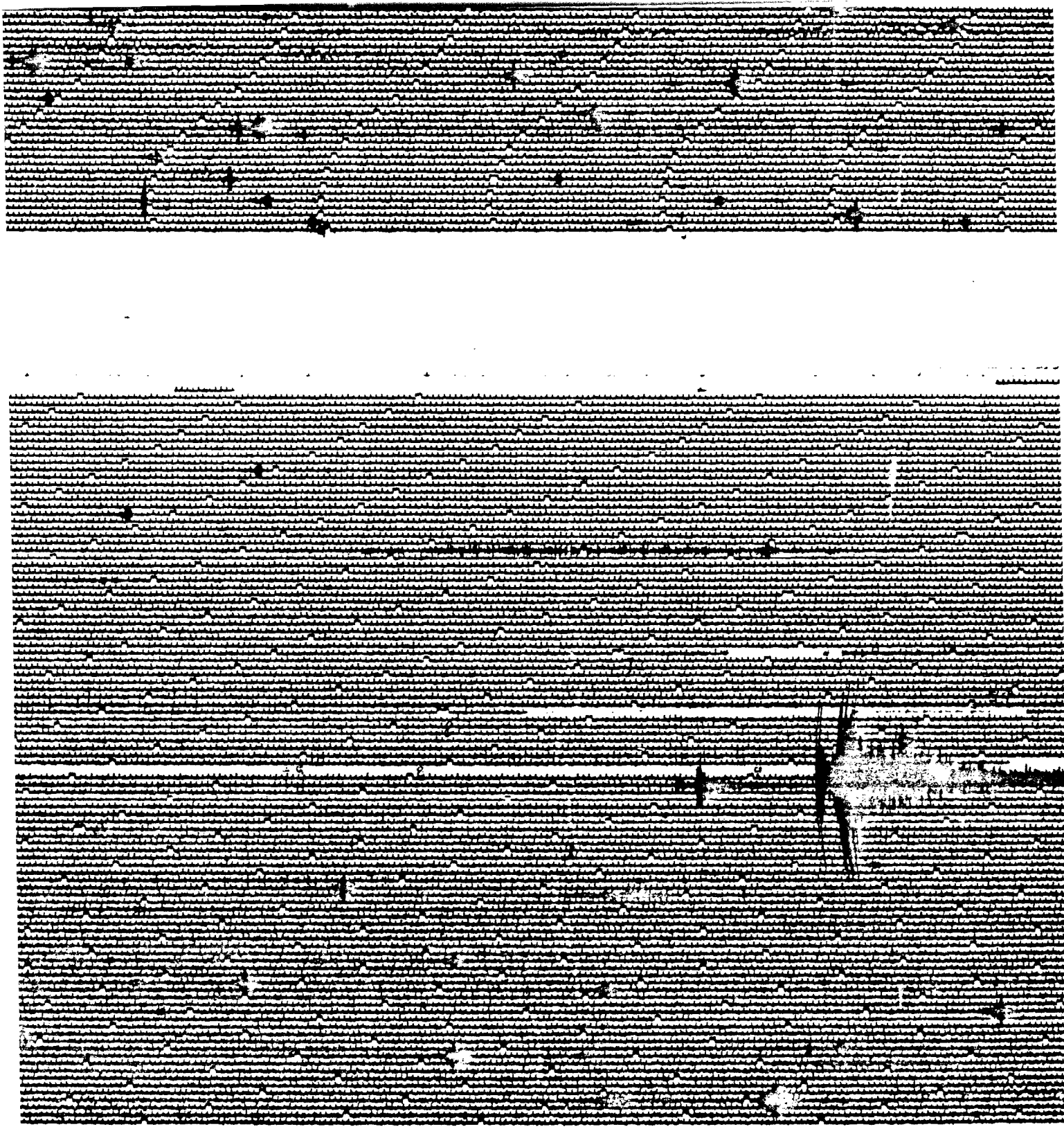


Figure 4. GBG recording of Lake sinclair's aftershocks, August 4.
Larger (m_b =1.0) . Origin time 09:09:7.59 (ID NO. 44).

Figure 5. REG recording of lake sinclair's double-event, august 6 (ID NO. 74,72).

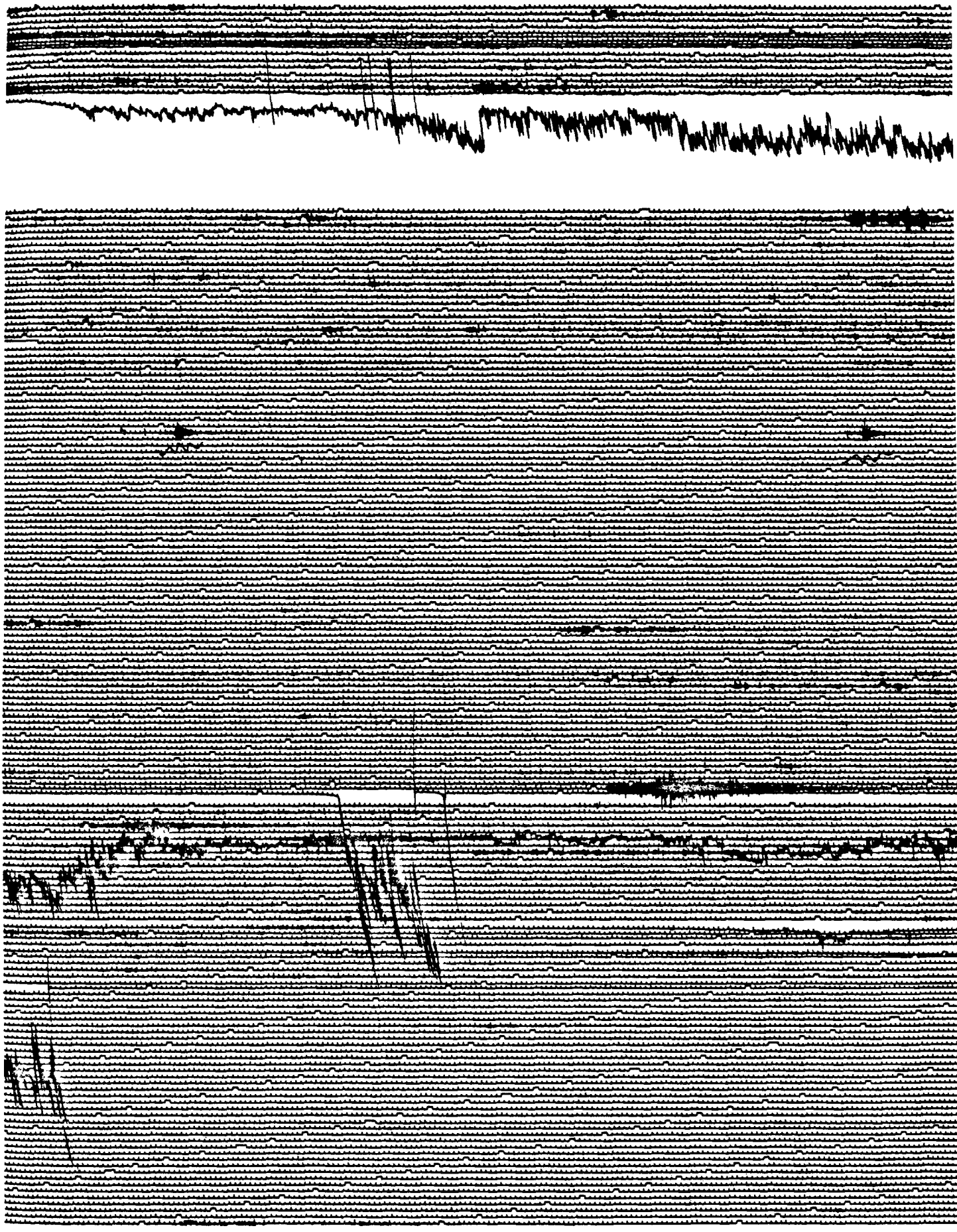
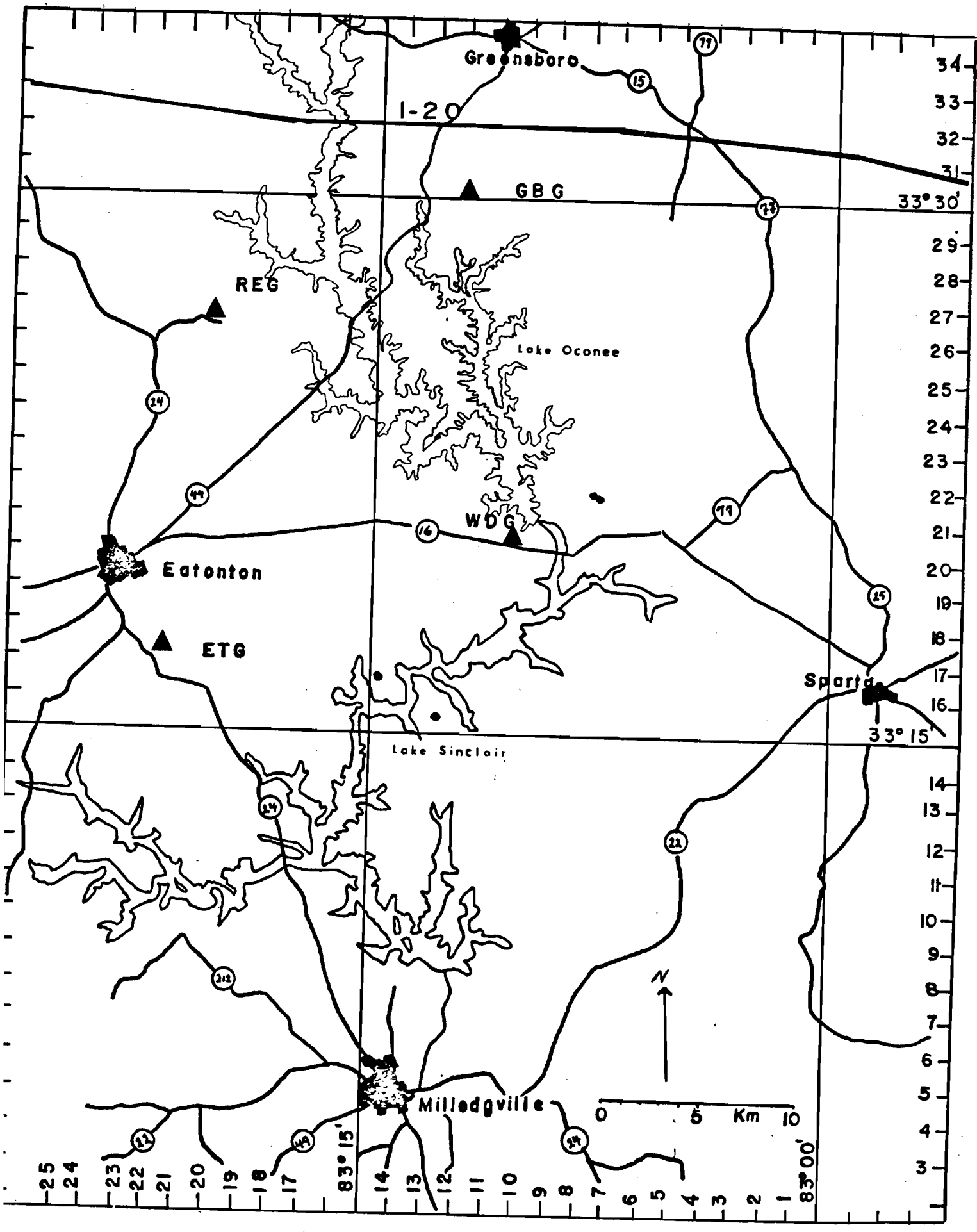
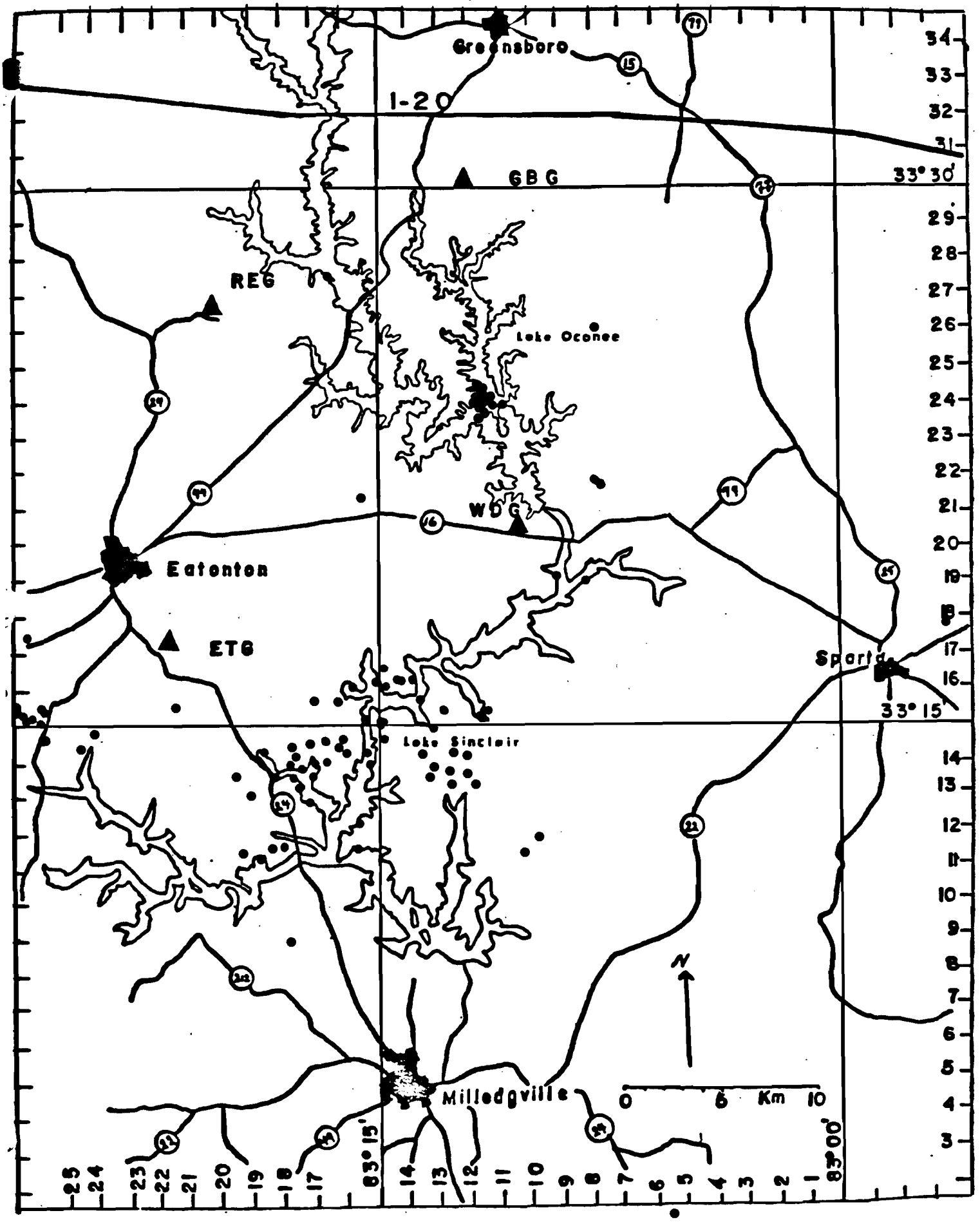


Figure 6. Lake sinclair events during this recording period.



Cumulative distribution of events in both lakes sinclair and oconee.

FIGURE VII



G-35-653

GEORGIA INSTITUTE OF TECHNOLOGY
SCHOOL OF GEOPHYSICAL SCIENCES
Atlanta, Georgia 30332
(404) 894-2857

December 5, 1980

Mr. R. C. Thrasher
Georgia Power Company
P. O. Box 4545
Atlanta, Georgia 30302

Subject: Quarterly Letter Report No. 17, Covering the Period 1 September to 30 November 1980

Re: Seismic Monitoring near Wallace Dam, Georgia

Dear Sir:

The total cummulative percentage recording coverage for the Wallace Dam net for the period of 1 September to 30 November 1980 was 99.9%. This corresponds to a cumulative percentage of 100, 99.7 and 100 for the months of September, October and November, respectively.

One Lake Oconee event was recorded in September, three Lake Sinclair events occurred during October and four more events occurred during November, two of which occurred in the Lake Oconee area.

The most powerful of these signatures was the one with (I.D. No. 76) occurring on October 11 southeast of Lake Sinclair and the other with (I.D. No. 81) occurring on November 16 with m_b = 1.2 in Lake Sinclair area. Information about these and others are given in the table enclosed. This report also contains the type of waveform encountered in each station for every event under consideration, given in figures 1-18. Figure 19, 20 and 21 show the locations of the Lake Sinclair events, Lake Oconee events and the cumulative distribution of all events thus far recorded in both areas, respectively.

Due to the resumption of Lake Oconee activity during this period, special attention will be focused at that area for the purpose of possible near-field monitoring for aftershock activity whenever a promising event happens to occur.

Respectfully submitted,

Nabil I. Al-Alusi

Leland T. Long
Associate Professor

LTL/dh

AREA	ID NO.	DATE	ORIGIN TIME	LATITUDE	LONGITUDE	DEPTH	MAG
		LAKE OCONEE 16-9-80 (?)					
WDF	80	80/09/16	18:45:36.55	33.4488	83.1786	0.00C	
		GBG PG	18:45: 37.600		+/- .100		
		GBG S-P	00:00: 1.000		+/- .100		
		REG PLG	18:45: 39.500		+/- .100		
		REG SLG-PLG	00:00: 2.350		+/- .100		
		LAKE SINCLAIR 11-10-80					
WDF	76	80/10/11	19:57:44.97	33.0724	83.0589	0.00C	1.0
		ETG PLG	19:57: 51.250		+/- .100		
		ETG SLG-PLG	00:00: 5.250		+/- .100		
		REG PLG	19:57: 53.500		+/- .100		
		REG SLG-PLG	00:00: 6.250		+/- .100		
		GBG PLG	19:57: 53.600		+/- .100		
		GBG SLG-PLG	00:00: 6.450		+/- .100		
		LAKE SINCLAIR 12-10-80					
WDF	77	80/10/12	08:38:20.05	33.3018	83.3065	0.00C	0.0
		ETG PG	08:38: 20.750		+/- .100		
		ETG S-P	00:00: .800		+/- .100		
		REG PLG	08:38: 23.000		+/- .100		
		REG SLG-PLG	00:00: 2.500		+/- .100		
		GBG PLG	08:38: 24.500		+/- .100		
		GBG SLG-PLG	00:00: 3.600		+/- .100		
		LAKE SINCLAIR 22-10-1980					
WDF	78	80/10/22	10:08:14.61	33.3293	83.2610	0.00C	0.5
		ETG PG	10:08: 16.200		+/- .100		
		ETG S-P	00:00: 1.400		+/- .100		
		REG PLG	10:08: 17.500		+/- .100		
		REG SLG-PLG	00:00: 2.300		+/- .100		
		LAKE SINCLAIR 5-11-80					
WDF	79	80/11/05	04:40:51.17	33.2876	83.2750	0.00C	0.0
		ETG PG	04:40: 52.325		+/- .100		
		ETG S-P	00:00: 1.125		+/- .100		
		REG PLG	04:40: 54.700		+/- .100		
		REG SLG-PLG	00:00: 2.700		+/- .100		
		LAKE SINCLAIR 16-11-80 (?)					
WDF	81	80/11/16	01:29:56.35	33.2955	83.2809	0.00C	1.2
		ETG PG	01:29: 57.400		+/- .100		
		ETG S-P	00:00: 1.000		+/- .100		
		GBG PLG	01:30: .650		+/- .100		
		GBG SLG-PLG	00:00: 3.400		+/- .100		
		REG PLG	01:29: 59.700		+/- .100		
		REG SLG-PLG	00:00: 2.700		+/- .100		
		LAKE OCONEE 23-11-80					
WDF	82	80/11/23	17:02:49.69	33.4325	83.1837	0.00C	0.0
		REG PG	17:02: 52.400		+/- .100		
		REG S-P	00:00: 1.750		+/- .100		
		GBG PG	17:02: 51.000		+/- .100		
		GBG S-P	00:00: 1.200		+/- .100		

AREA	ID NO.	DATE	ORIGIN TIME	LATITUDE	LONGITUDE	DEPTH	MAG
		LAKE OCONEE 26-11-80 (?)					
WDF	83	80/11/26	07:17:41.95	33.4251	83.2176	0.00C	0.0
		REG PG	07:17: 44.000	+/-	@.100		
		REG S-P	00:00: 1.500	+/-	.100		
		GBG PG	07:17: 43.450	+/-	.100		
		GBG S-P	00:00: 1.100	+/-	.100		

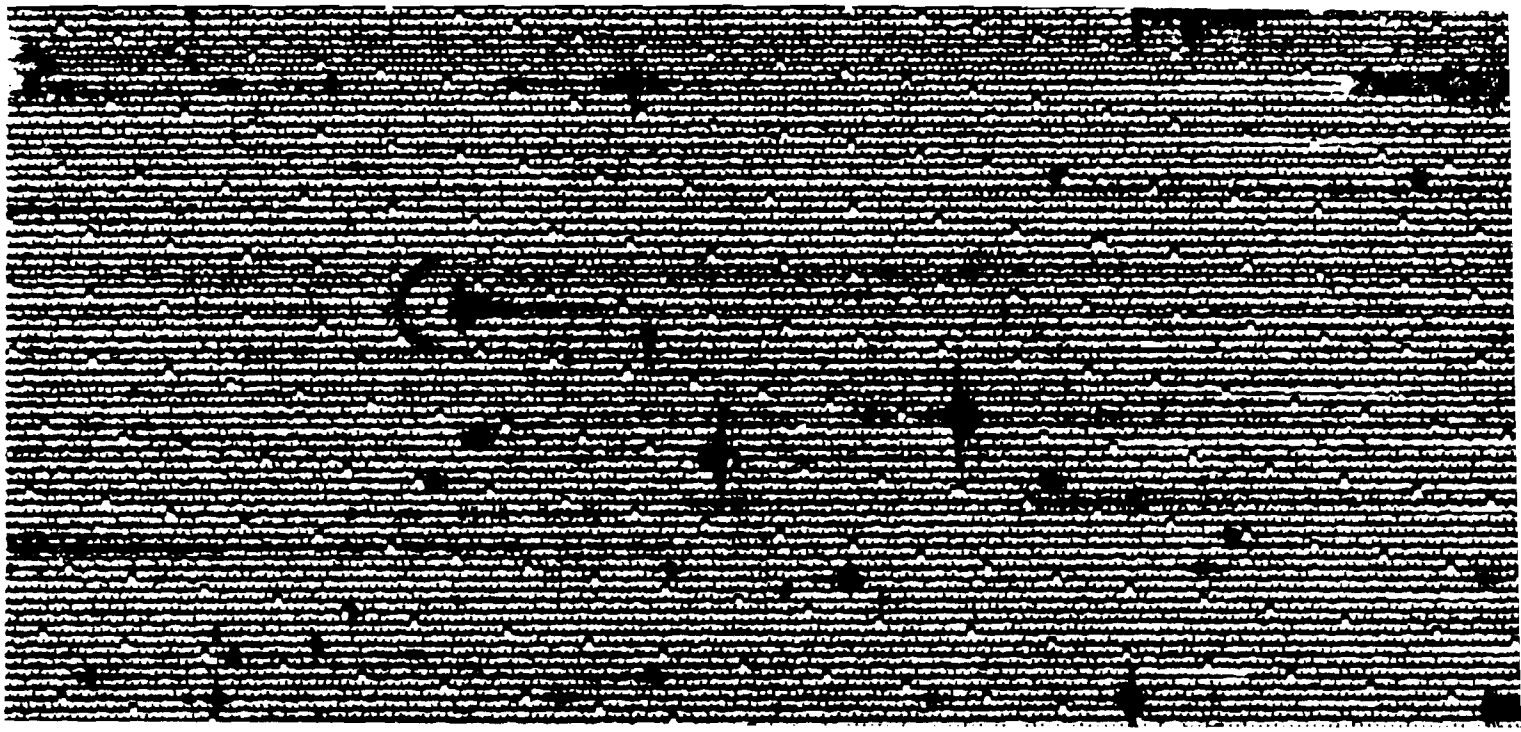


Figure 1. GBG recording of Lake Oconee's event, September 16 (ID No. 80).

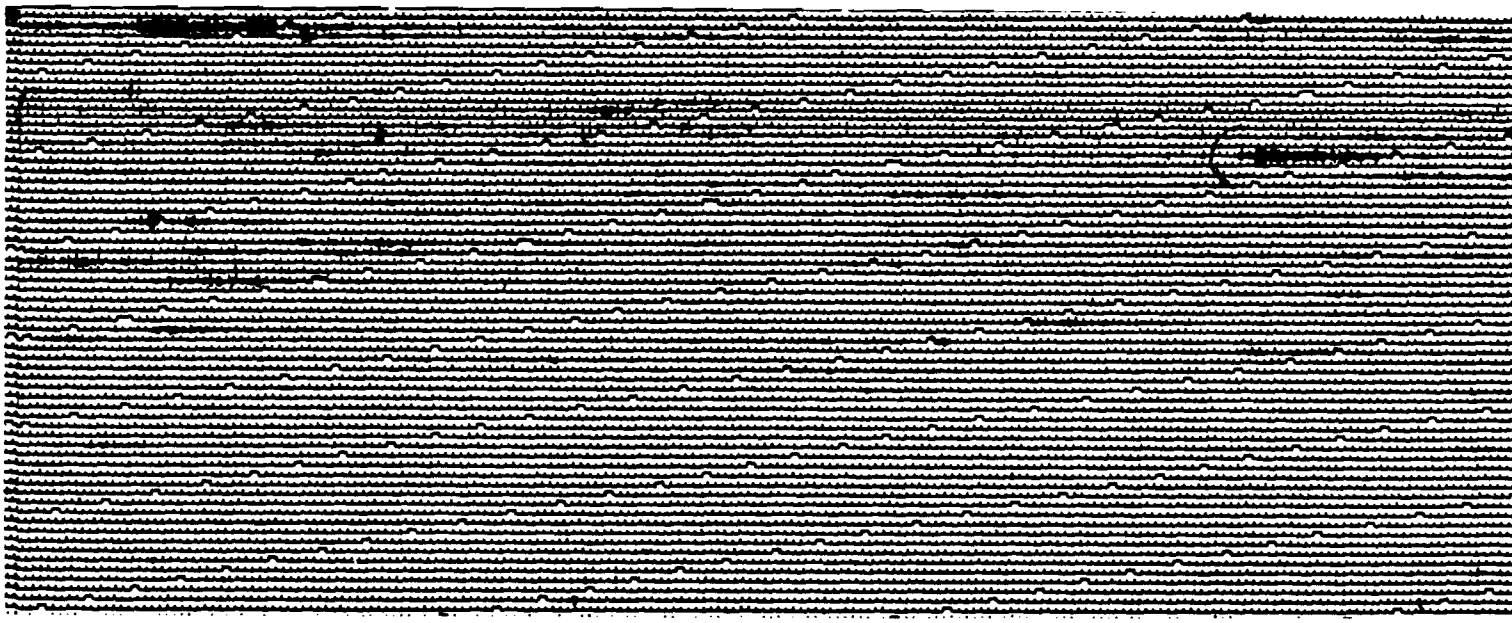


Figure 2. REG recording of Lake Oconee's event, September 16 (ID No. 80).

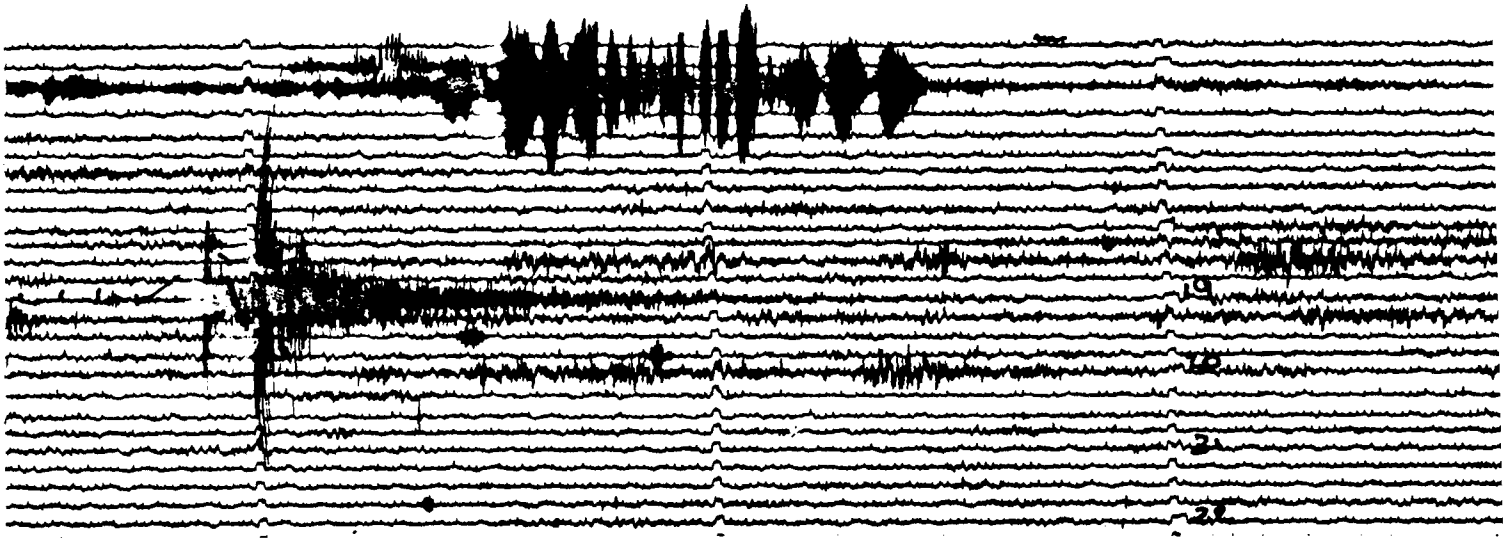


Figure 3. GBG recording of Lake Sinclair's event, October 11 (ID No. 76).

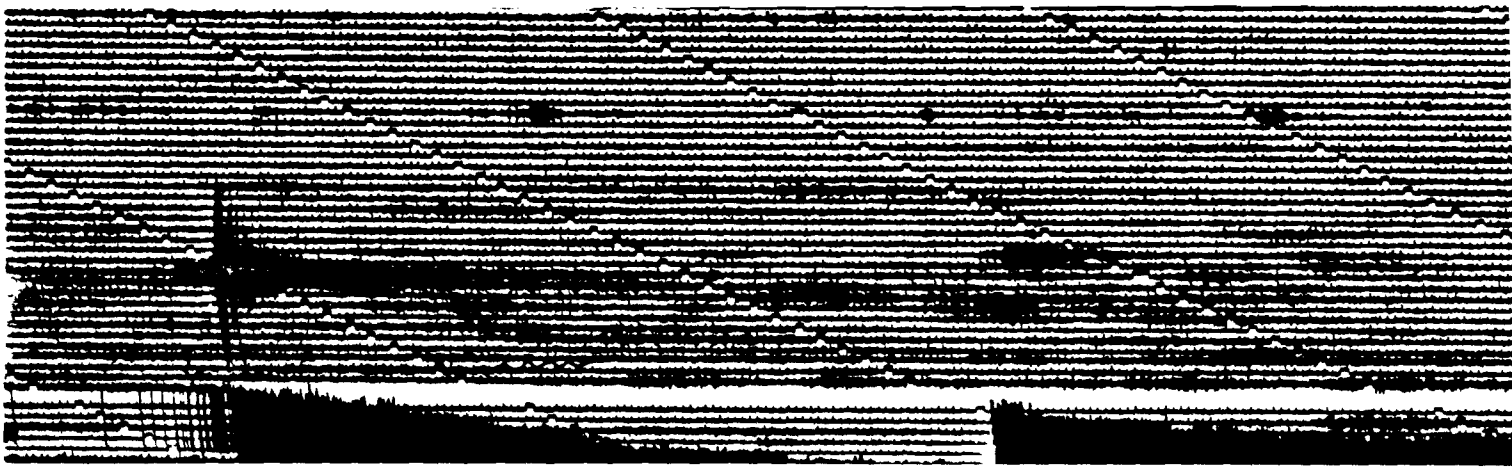


Figure 4. ETG recording of Lake Sinclair's event, October 11 (ID No. 76).

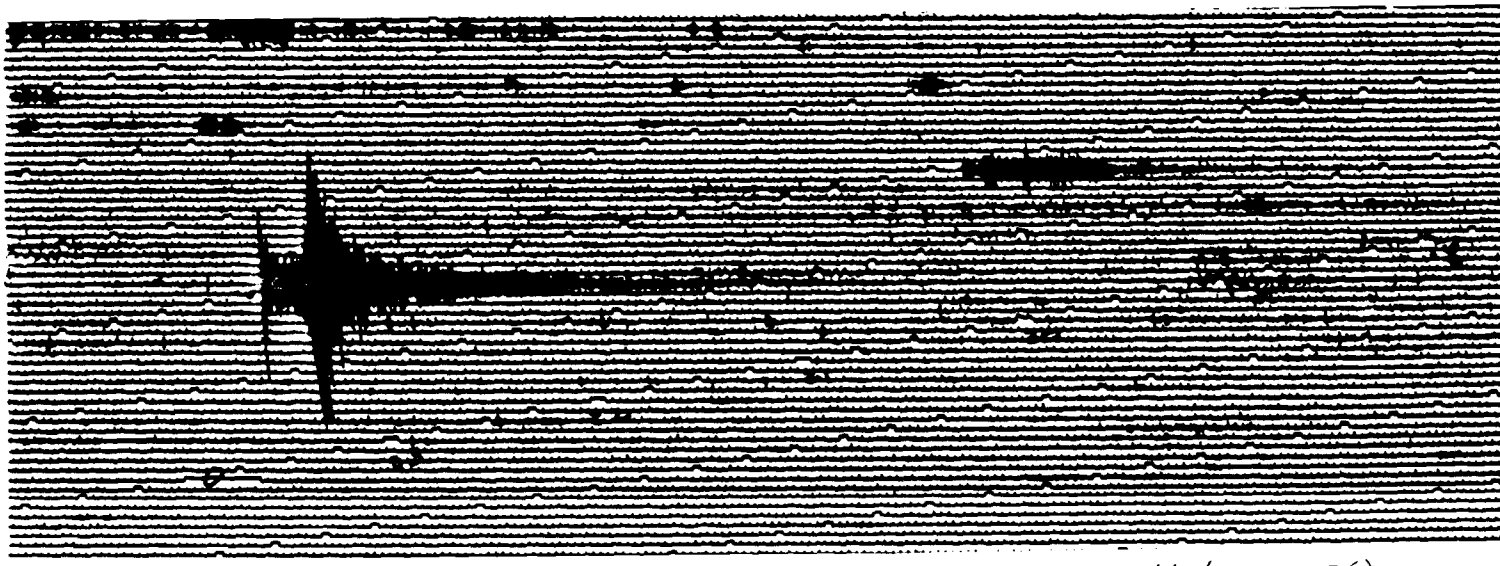


Figure 5. REG recording of Lake Sinclair's event, October 11 (ID No. 76).

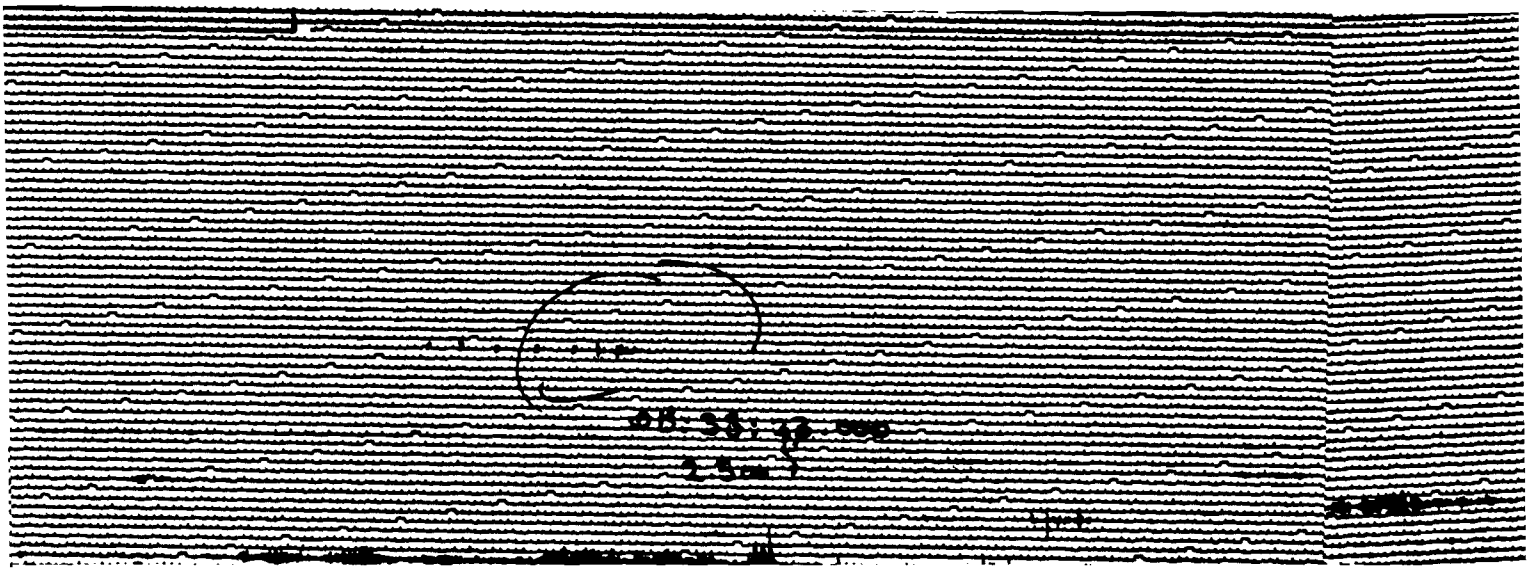


Figure 6. REG recording of Lake Sinclair's event, October 12 (ID NO. 77).

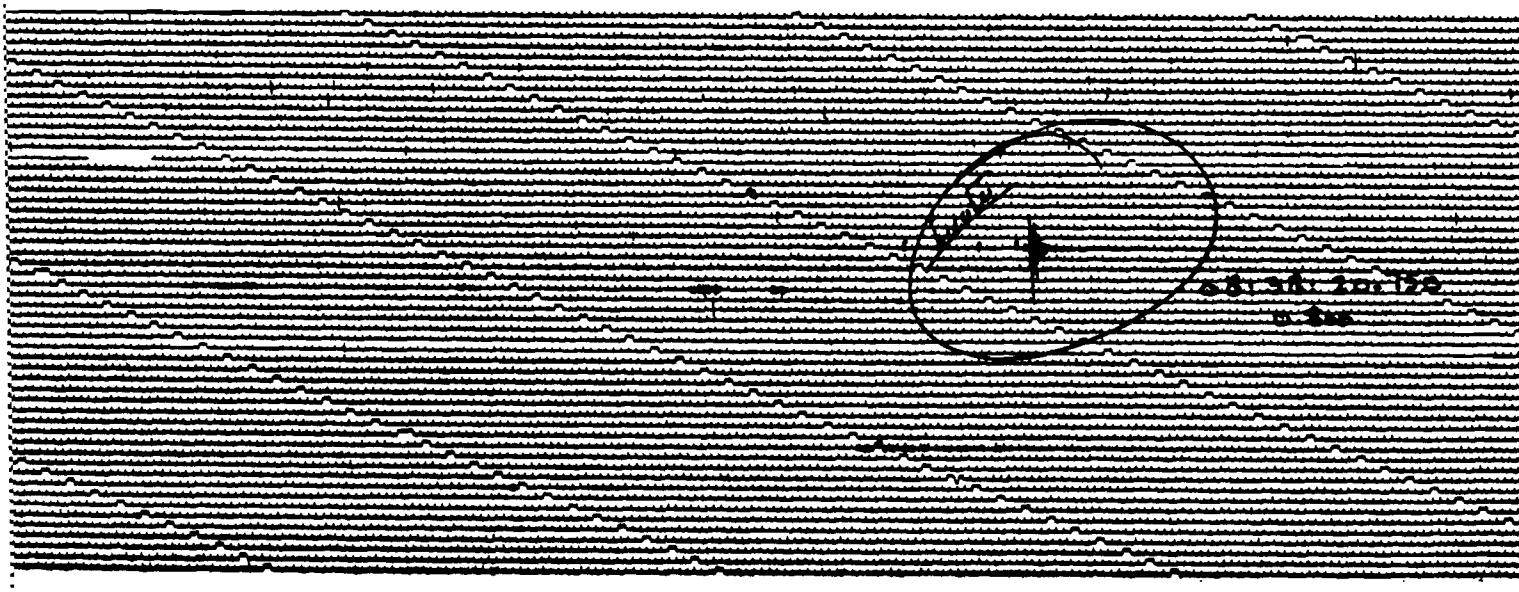


Figure 7. ETG recording of Lake Sinclair's event, October 12 (ID No. 77).

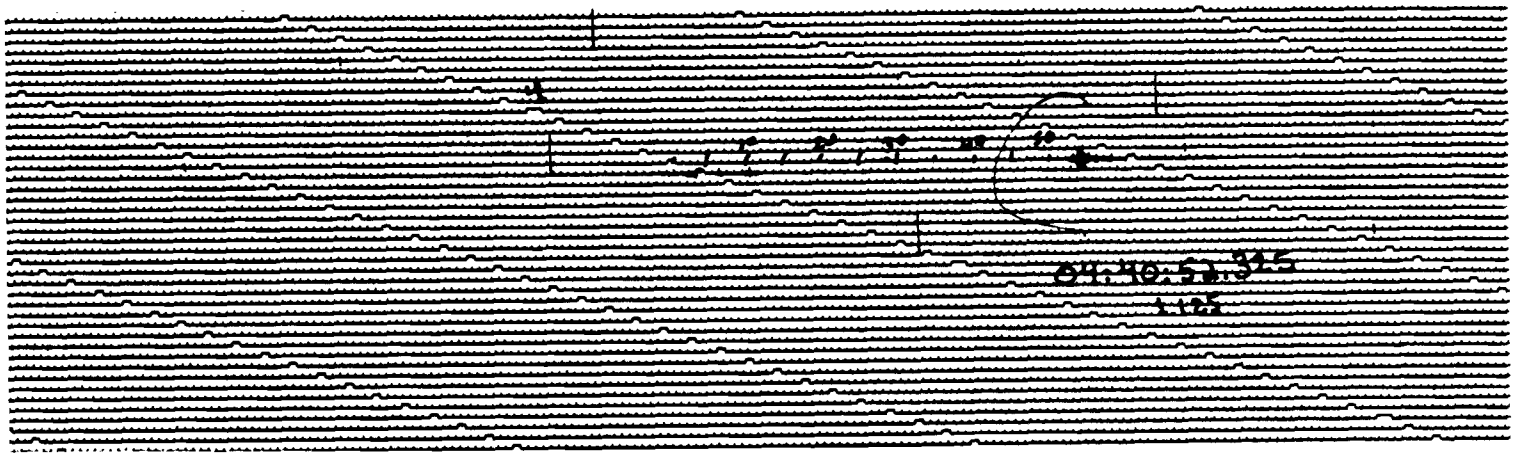


Figure 10. ETG recording of Lake Sinclair's event, November 5 (ID No.79).

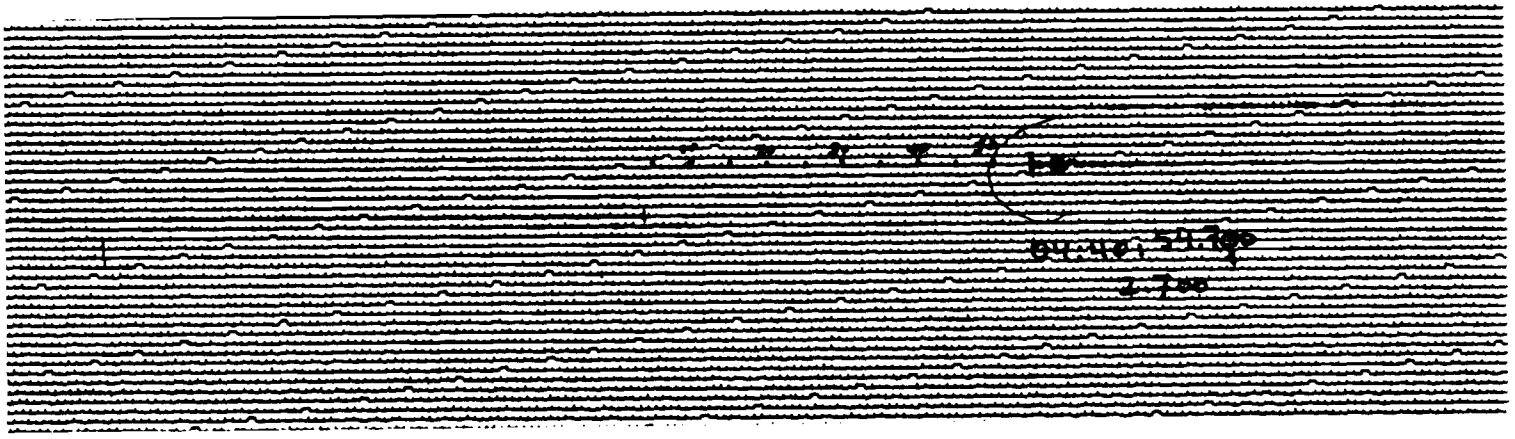


Figure 11. REG recording of Lake Sinclair's event, November 5 (ID No.79).

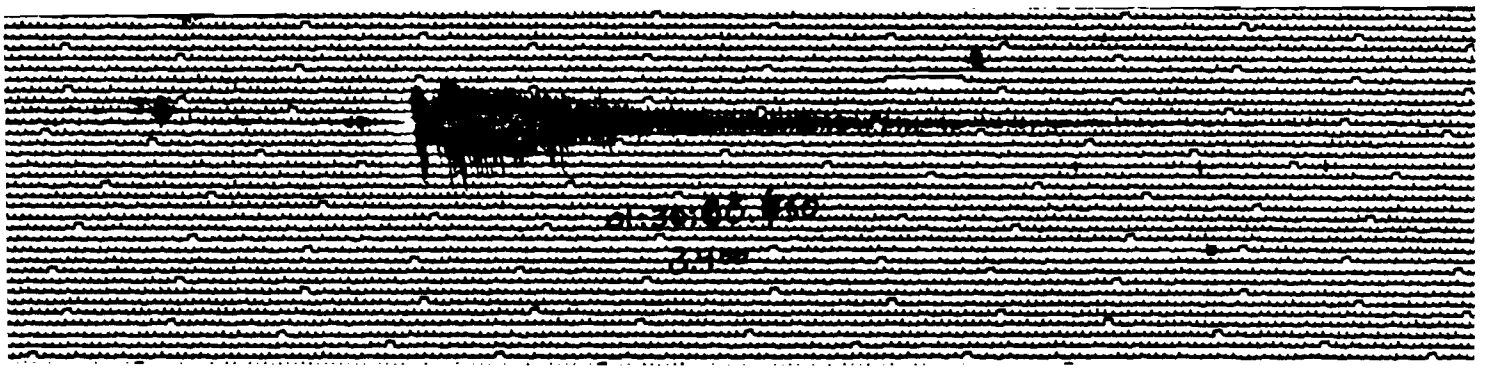


Figure 12. GBG recording of Lake Sinclair's event, November 16 (ID No.81).

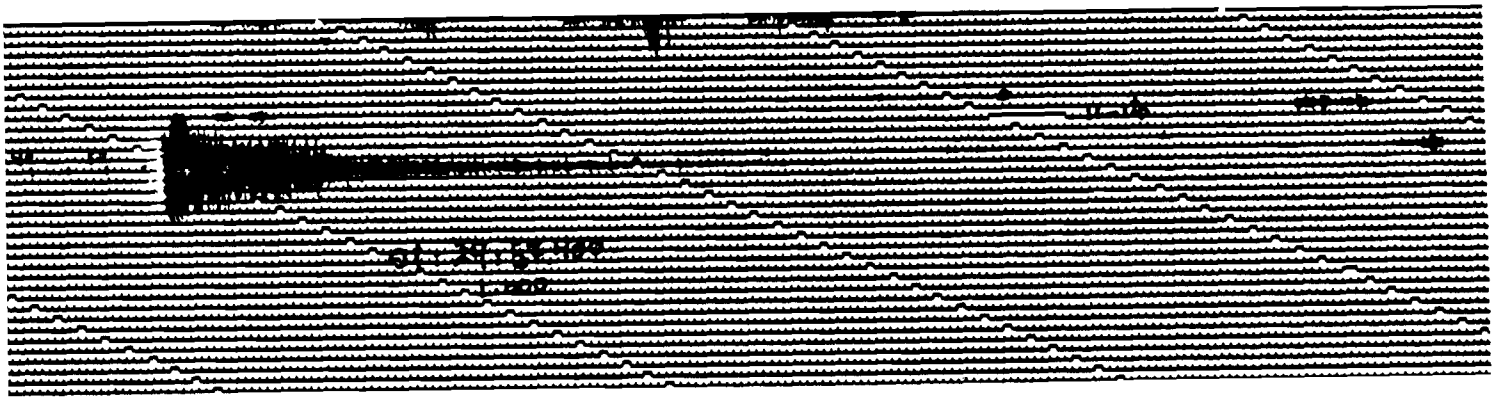


Figure 13. ETG recording of Lake Sinclair's event, November 16 (ID No.81).

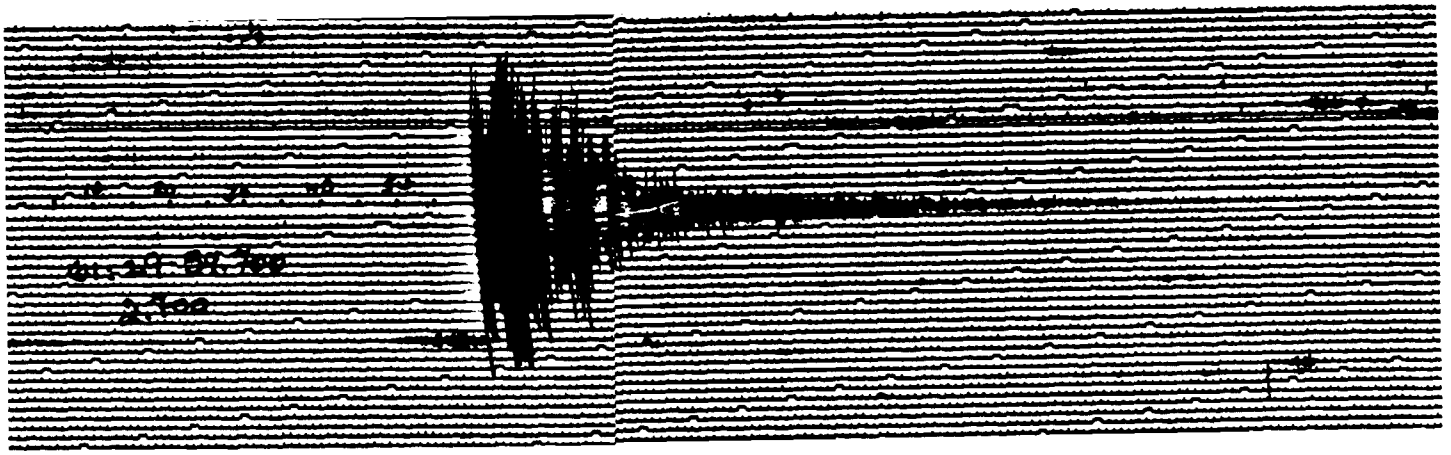


Figure 14. RBG recording of Lake Sinclair's event, November 16 (ID No.81).

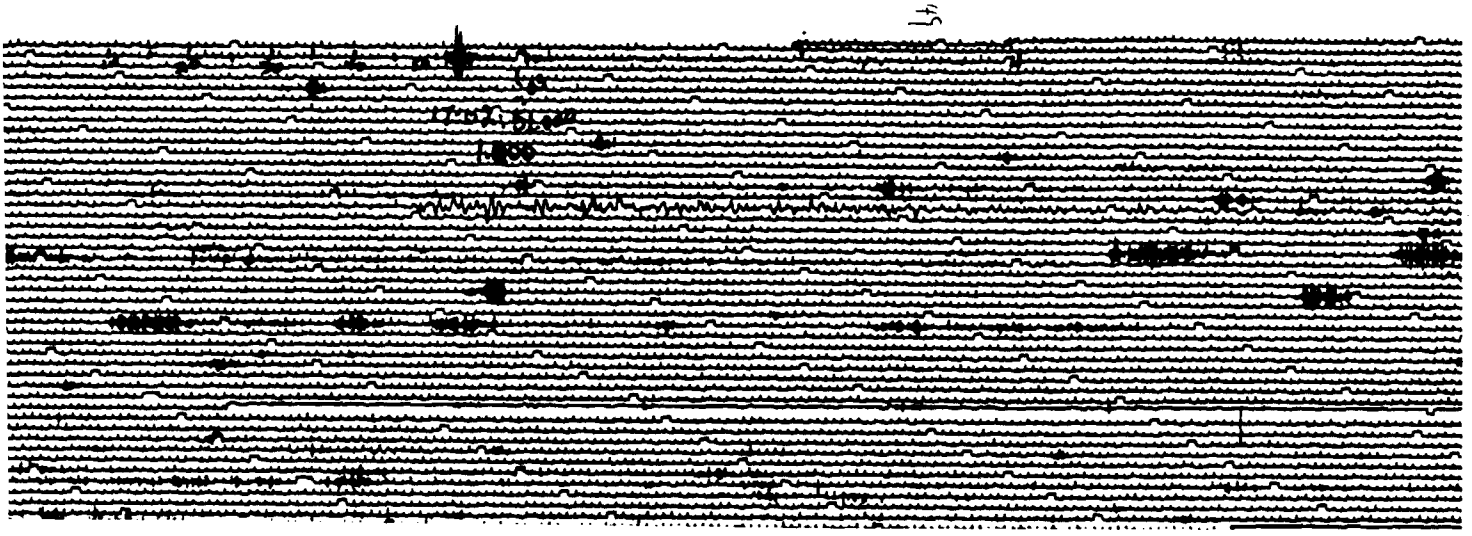


Figure 15. GBG recording of Lake Oconee's event, November 23 (ID No.82).

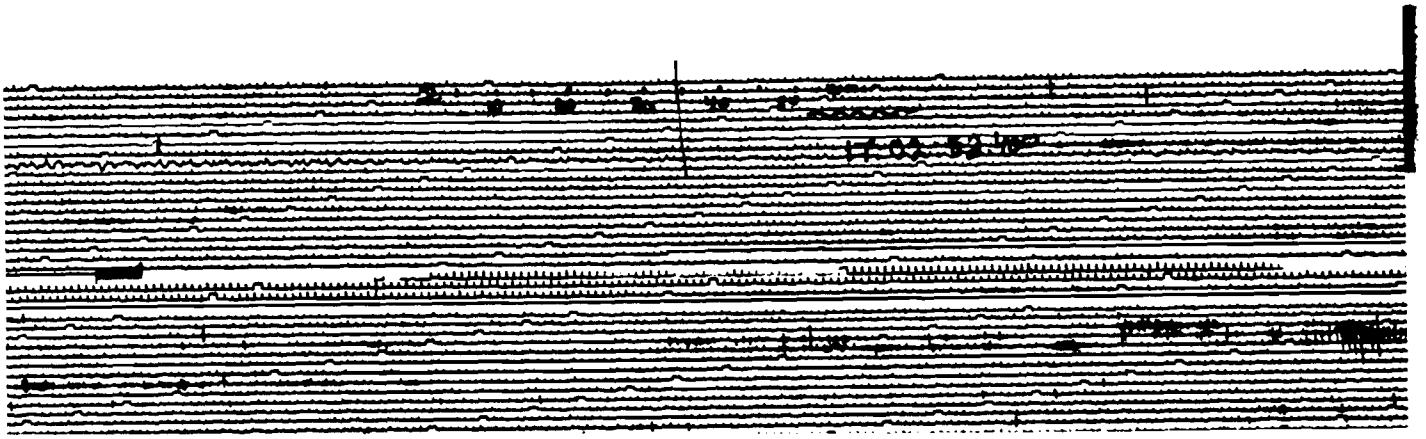


Figure 16. REG recording of Lake Oconee's event, November 23 (ID No.82).

Figure 17. GBG recording of Lake Oconee's event, November 26 (ID No. 83).

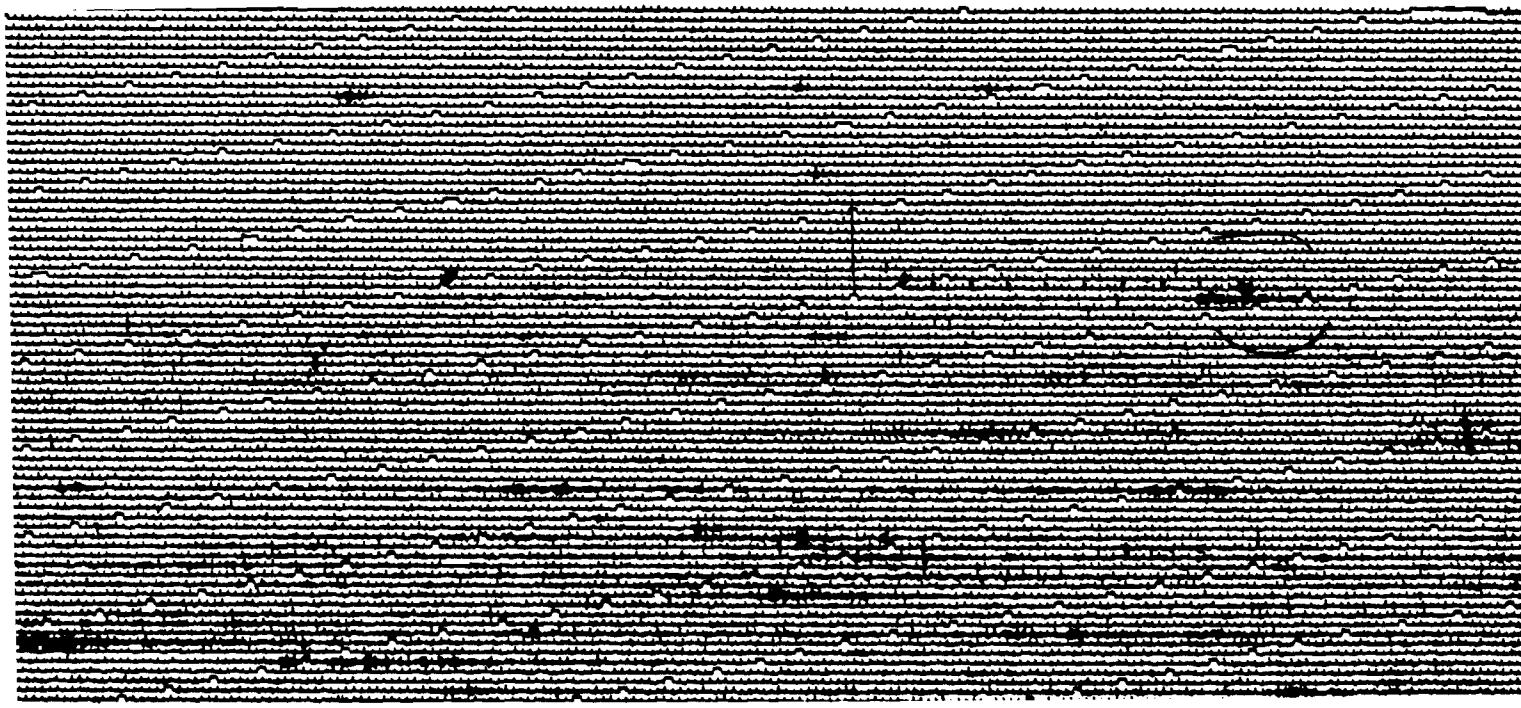


Figure 18. REG recording of Lake Oconee's event, November 26 (ID No.83).

Figure 19. Lake Sinclair events during this recording period.

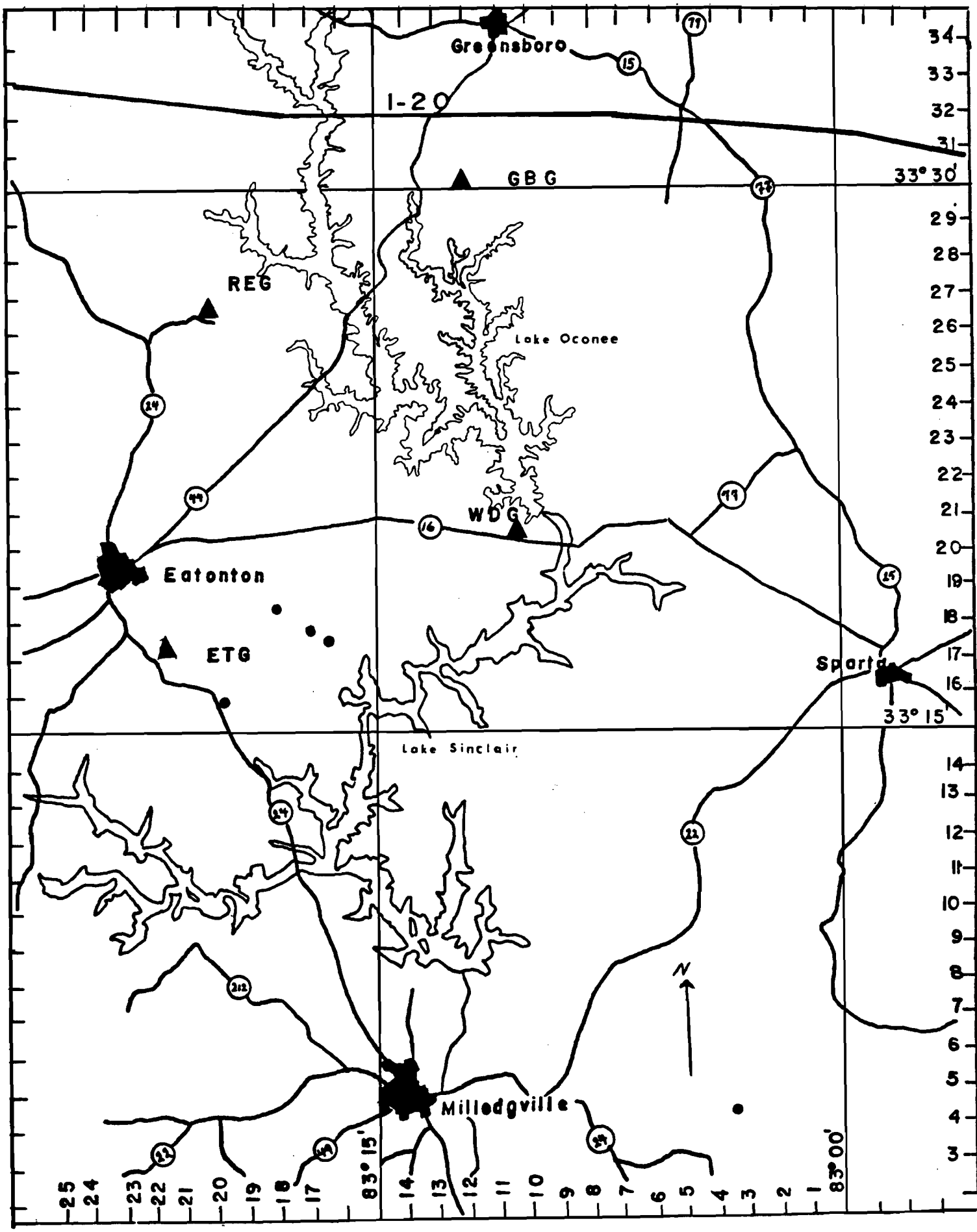


Figure 20. Lake Oconee events during this recording period.

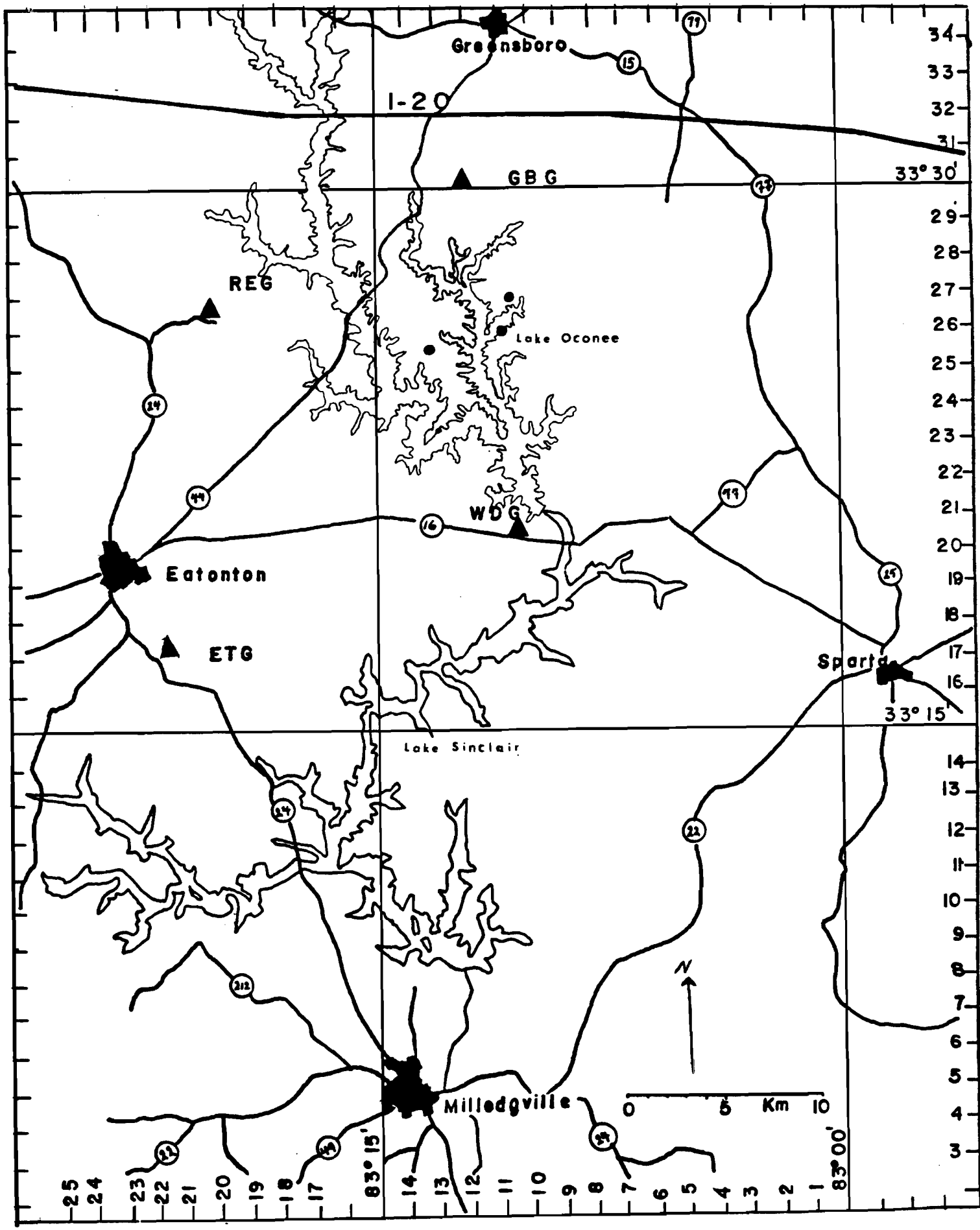
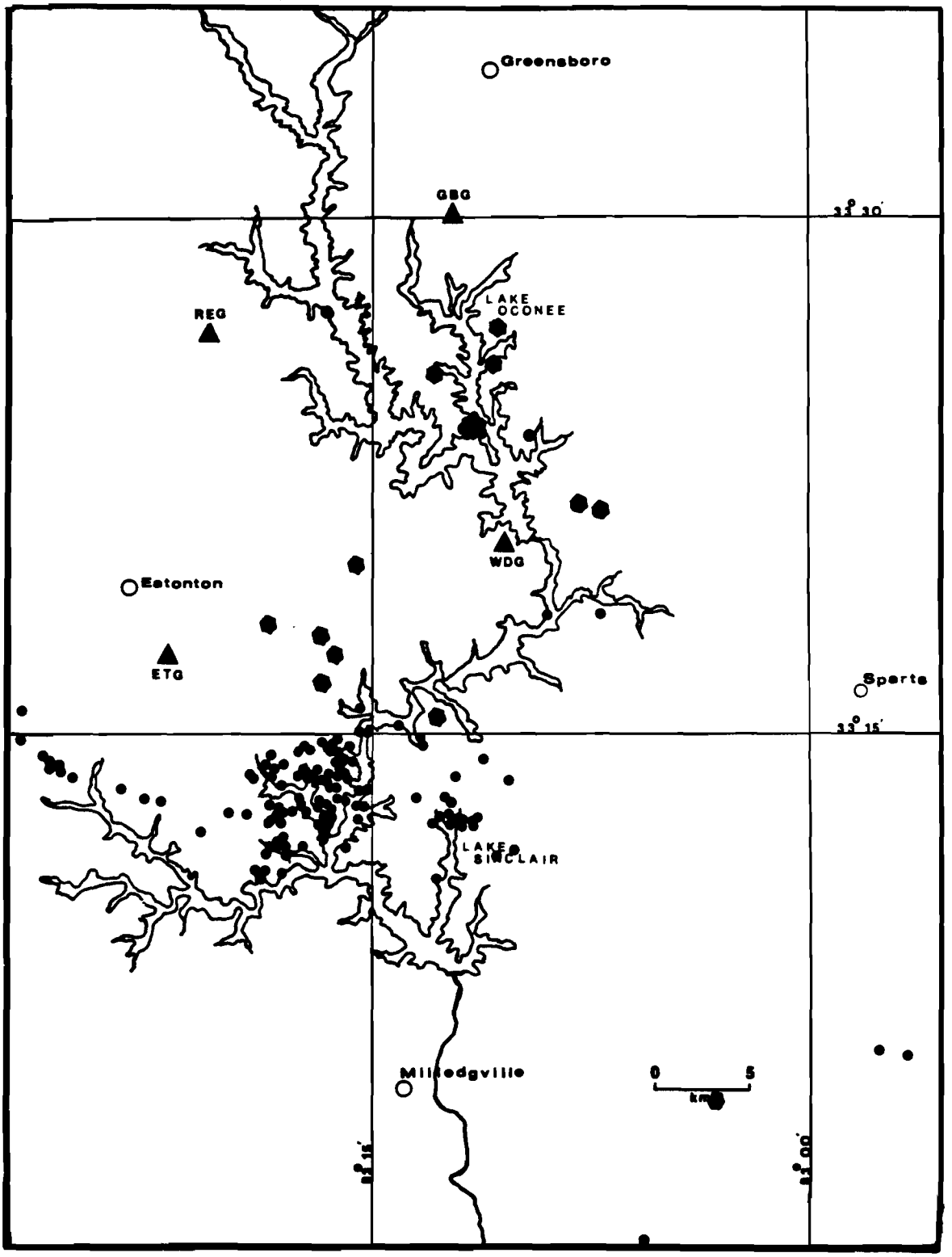


Figure 21. Cumulative distribution of events in both lake Sinclair and Lake Oconee.



9-23-63

GEORGIA INSTITUTE OF TECHNOLOGY
SCHOOL OF GEOPHYSICAL SCIENCES
Atlanta, Georgia 30332
(404) 894-2857

June 2, 1981

Mr. R. C. Thrasher
Georgia Power Company
P.O. Box 4545
Atlanta, Georgia 30302

Subject: Quarterly Letter Report No. 18, Covering the Period 1 December 1980 to 28 February 1981

Re: Seismic Monitoring near Wallace Dam, Georgia

Dear Sir:

The average record coverage for the Wallace Dam net for the period of 1 December 1980 to 28 February 1981 was 98.67%. This corresponds to record coverages of 100, 100 and 96 percent for the months of December, January and February, respectively.

One Lake Oconee event and five Lake Sinclair events were recorded during December, four Lake Sinclair events occurred during January, and one more event in February. Two possible events in the Lake Oconee area were recorded during February.

A listing of these events is given in the enclosed table. The recordings of these events at each seismic station are given in Figures 1 through 25. Figures 26, 27 and 28 show the locations of the Lake Sinclair events, Lake Oconee events and the cumulative distribution of all events thus far recorded in both areas.

Respectfully submitted,

Leland T. Long
Associate Professor

LTL:ms

AREA	ID NO.	DATE	ORIGIN TIME	LATITUDE	LONGITUDE	DEPTH	MAGNITUDE
		LAKE SINCLAIR 10-12-80 (M.E.)					
WDP	89	80/12/10	08:23:27.77	33.2576	83.2836	0.00C	1.5
		ETG PG	08:23: 29.000		+/- .100		
		ETG S-P	00:00: 1.100		+/- .100		
		REG PG	08:23: 31.750		+/- .100		
		REG SG-PG	00:00: 3.100		+/- .100		
		LAKE SINCLAIR 12-10 0842 NOT LOC					
WDP	105	80/12/10	08:42:16.95	33.2000	83.2000	0.00C	0.0
		ETG PG	08:42: 21.000		+/- .200		
		ETG S-P	00:00: 1.500		+/- .200		
		LAKE SINCLAIR					
WDP	103	80/12/10	10:20: 3.05	33.3146	83.2771	0.00C	0.0
		ETG PG	10:20: 4.000		+/- .200		
		ETG S-P	00:00: 1.500		+/- .200		
		REG PG	10:20: 6.200		+/- .200		
		REG S-P	00:00: 1.500		+/- .200		
		LAKE SINCLAIR 12-10 1057					
WDP	106	80/12/10	10:57:25.85	33.2000	83.2000	0.00C	0.0
		ETG PG	10:57: 27.900		+/- .200		
		ETG S-P	00:00: 1.500		+/- .200		
		LAKE SINCLAIR 12-10 1112					
WDP	107	80/12/10	11:12:50.26	33.2732	83.2108	0.00C	0.0
		ETG PG	11:12: 52.850		+/- .200		
		ETG S-P	00:00: 1.500		+/- .200		
		REG PG	11:12: 54.100		+/- .200		
		REG S-P	00:00: 3.200		+/- .200		
		LAKE OCONEE HWY 16 AREA					
WDP	108	80/12/16	09:06: 7.89	33.3697	83.2557	0.00C	0.0
		ETG PG	09:06: 10.150		+/- .200		
		ETG S-P	00:00: 1.650		+/- .200		
		REG PG	09:06: 9.900		+/- .200		
		REG S-P	00:00: 1.470		+/- .200		
		LAKE SINCLAIR 01-20 0514					
WDP	109	81/01/20	05:14:21.83	33.2282	83.3166	0.00C	0.0
		ETG PG	05:14: 23.800		+/- .300		
		ETG S-P	00:00: 1.250		+/- .200		
		GBG PG	05:14: 28.050		+/- .200		
		GBG S-P	00:00: 4.250		+/- .200		
		REG PG	05:14: 25.300		+/- .200		
		REG S-P	00:00: 3.000		+/- .200		
		LAKE SINCLAIR ?					
WDP	110	81/01/26	16:29:35.74	32.0000	83.0000	0.00C	0.0
		ETG PG	16:29: 36.700		+/- .200		
		ETG S-P	00:00: .700		+/- .200		
		LAKE SINCLAIR					
WDP	111	81/01/30	22:23: 9.87	33.2328	83.1711	0.00C	1.0
		ETG PG	22:23: 13.100		+/- .200		
		ETG S-P	00:00: 2.340		+/- .200		
		GBG PG	22:23: 15.250		+/- .200		
		GBG S-P	00:00: 3.900		+/- .200		
		REG PG	22:23: 15.000		+/- .200		
		REG S-P	00:00: 3.800		+/- .200		

LAKE SINCLAIR

WDP	112	81/01/31	20:35:39.23	33.2701	83.1896	0.00C	0.0
		ETG	PG	20:35: 41.900	+/-	.200	
		ETG	S-P	00:00: 2.150	+/-	.200	
		REG	PG	20:35: 43.600	+/-	.200	
		REG	S-P	00:00: 3.000	+/-	.200	

LAKE OCONNE ?

WDP	113	81/02/15	01:57:24.77	32.0000	83.0000	0.00C	0.0
		REG	PG	01:57: 26.700	+/-	.200	
		REG	S-P	00:00: 1.000	+/-	.200	

LAKE OCONEE ?

WDP	114	81/02/15	11:10:25.49	33.0000	83.0000	0.00C	0.0
		REG	PG	11:10: 27.000	+/-	.200	
		REG	S-P	00:00: 1.100	+/-	.200	

LAKE SINCLAIR 02-24

WDP	115	81/02/24	12:34:14.41	33.2012	83.1788	0.00C	0.0
		ETG	PG	12:34: 17.900	+/-	.200	
		ETG	S-P	00:00: 2.700	+/-	.200	
		GBG	PG	12:34: 20.250	+/-	.200	
		GBG	S-P	00:00: 4.100	+/-	.200	
		REG	PG	12:34: 19.900	+/-	.200	
		REG	S-P	00:00: 3.800	+/-	.200	
		WDG	PG	12:34: 17.500	+/-	.200	
		WDG	S-P	00:00: 2.600	+/-	.200	

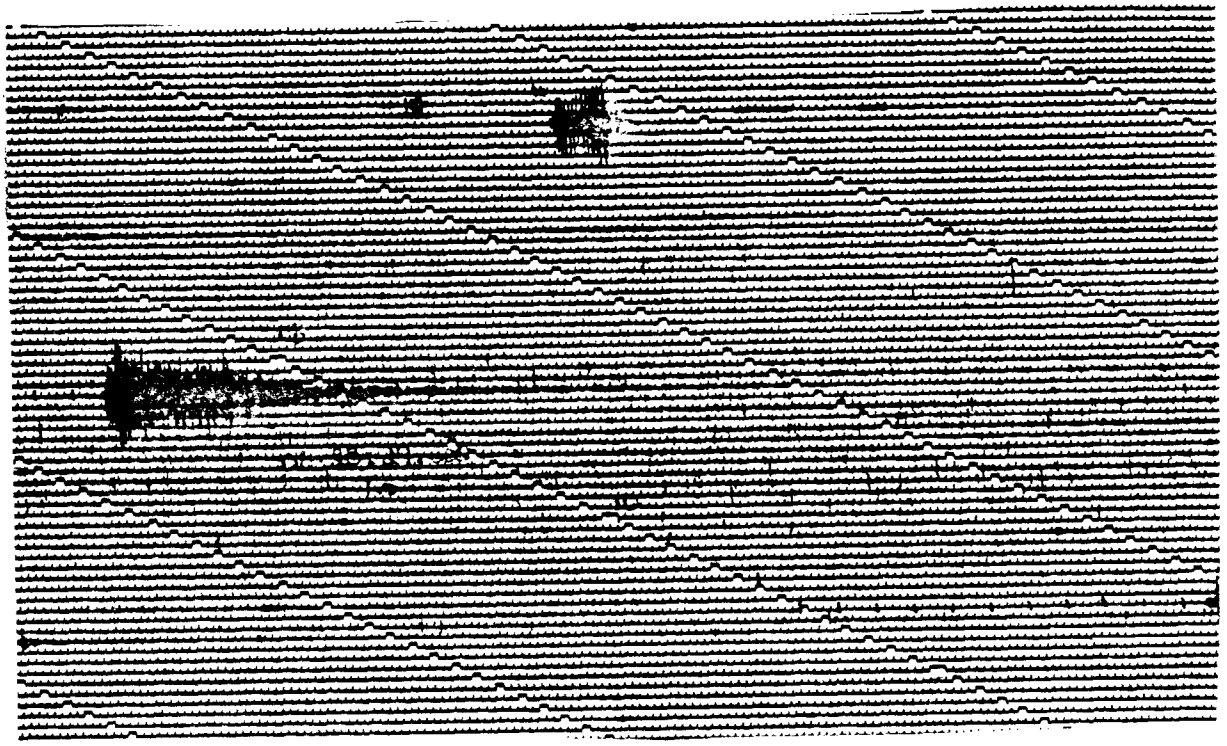


Figure 1. ETG recording of Lake Sinclair event, Dec. 10 (I.D. No. 89)

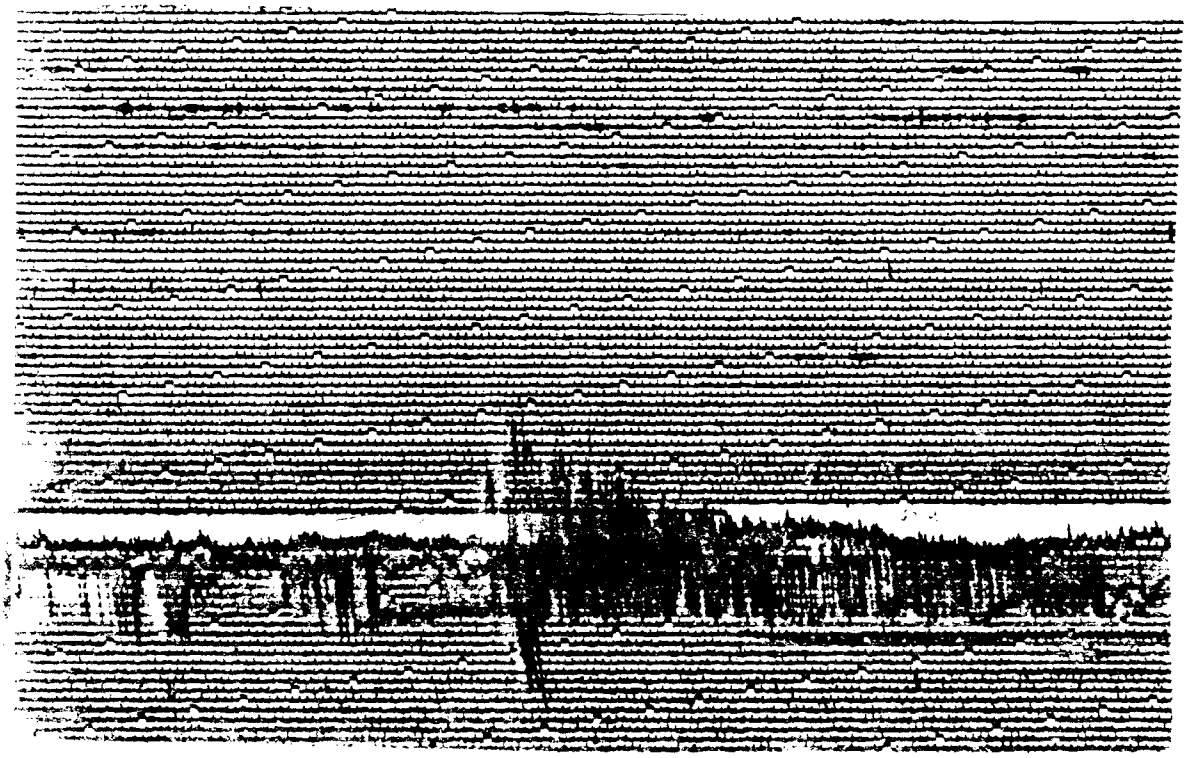


Figure 2. REG recording of Lake Sinclair event, Dec. 10 (I.D. No. 89)

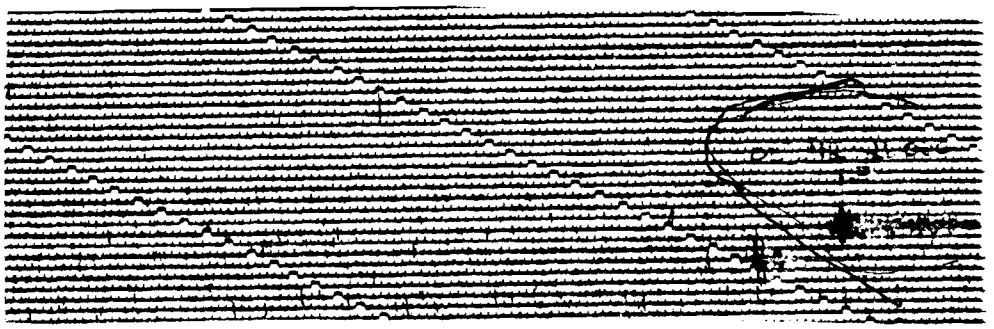


Figure 3. ETG recording of Lake Sinclair event, Dec. 10 (I.D. No. 105)

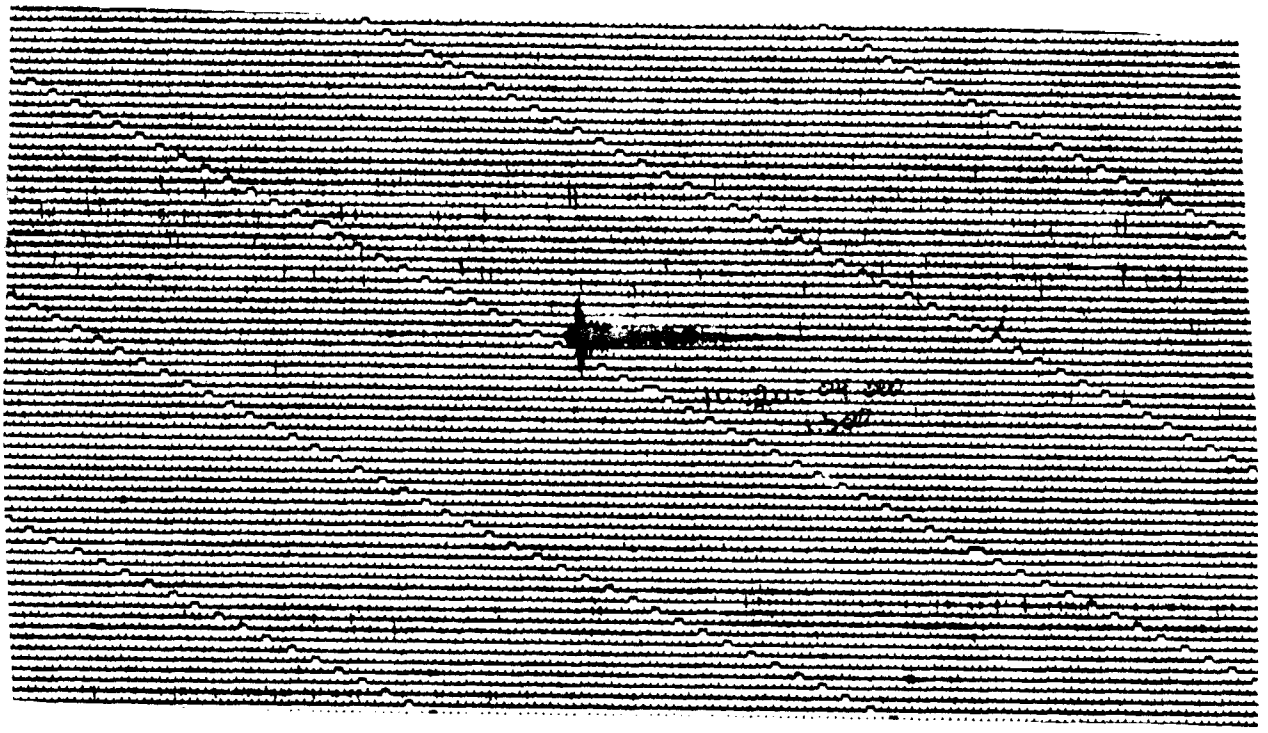


Figure 4. ETG recording of Lake Sinclair event, Dec. 10 (I.D. No. 103)

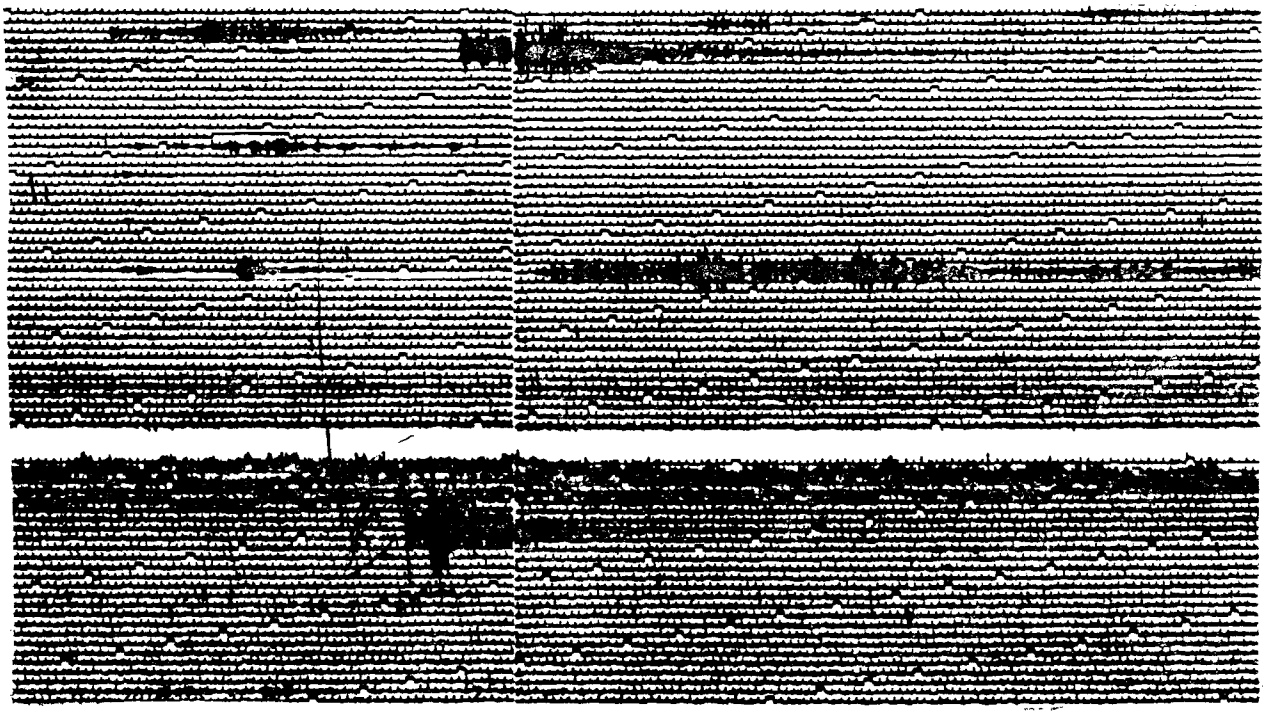


Figure 5. REG recording of Lake Sinclair event, Dec. 10 (I.D. No. 103)

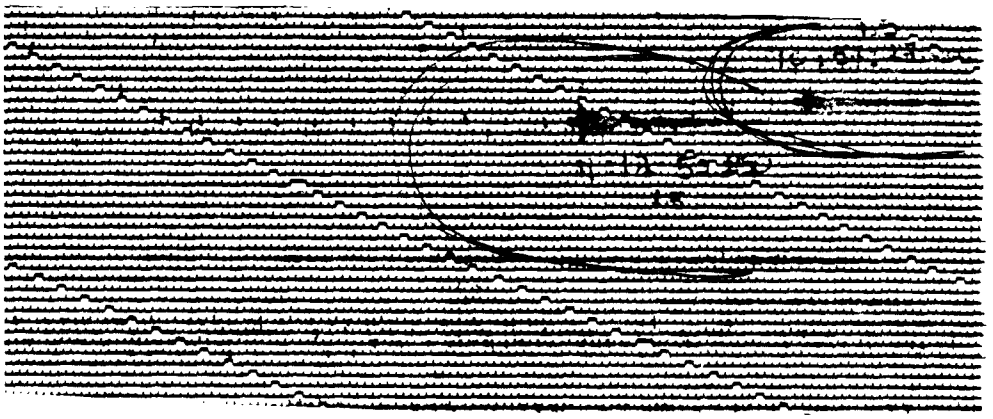


Figure 6. ETG recording of Lake Sinclair event, Dec. 10 (I.D. No. 106)

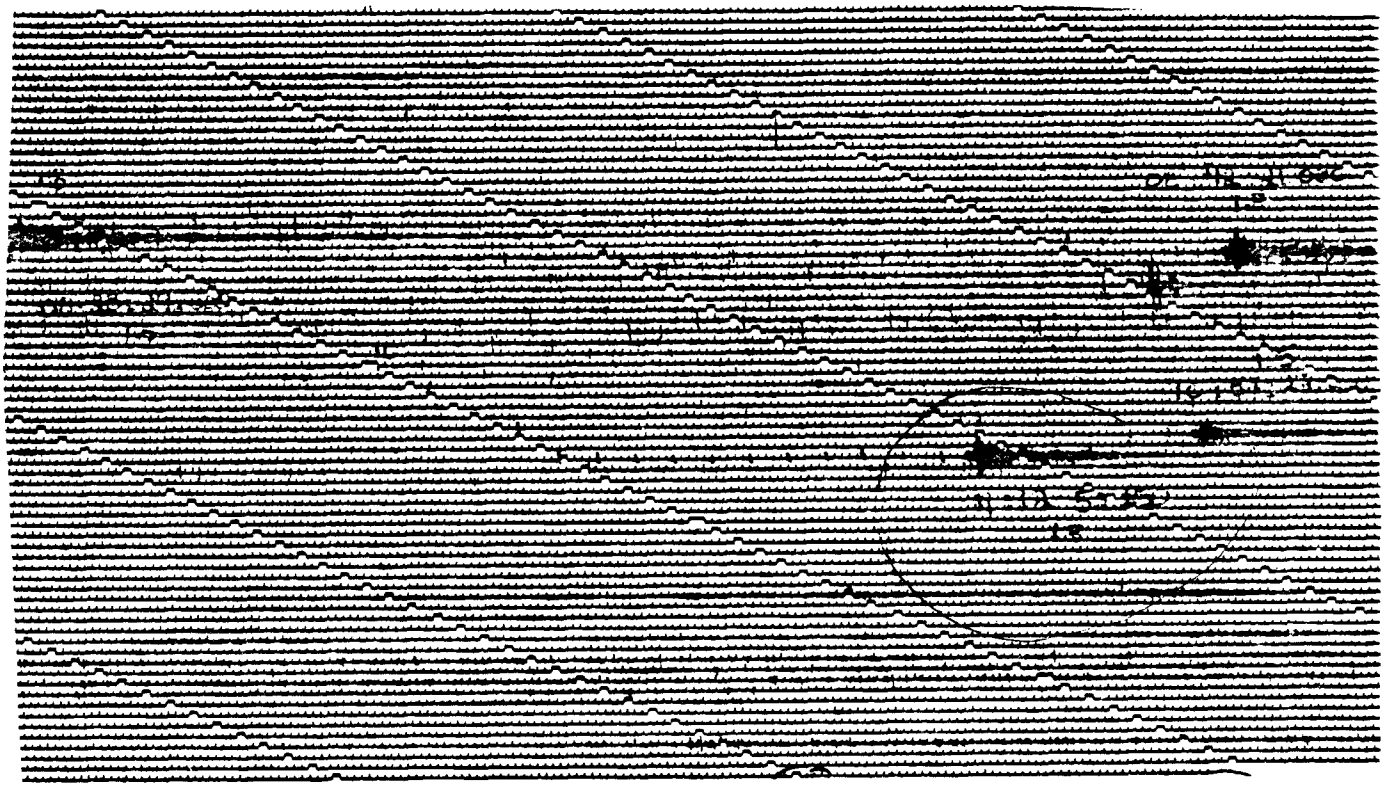


Figure 7. ETG recording of Lake Sinclair event, Dec. 10 (I.D. No. 107)

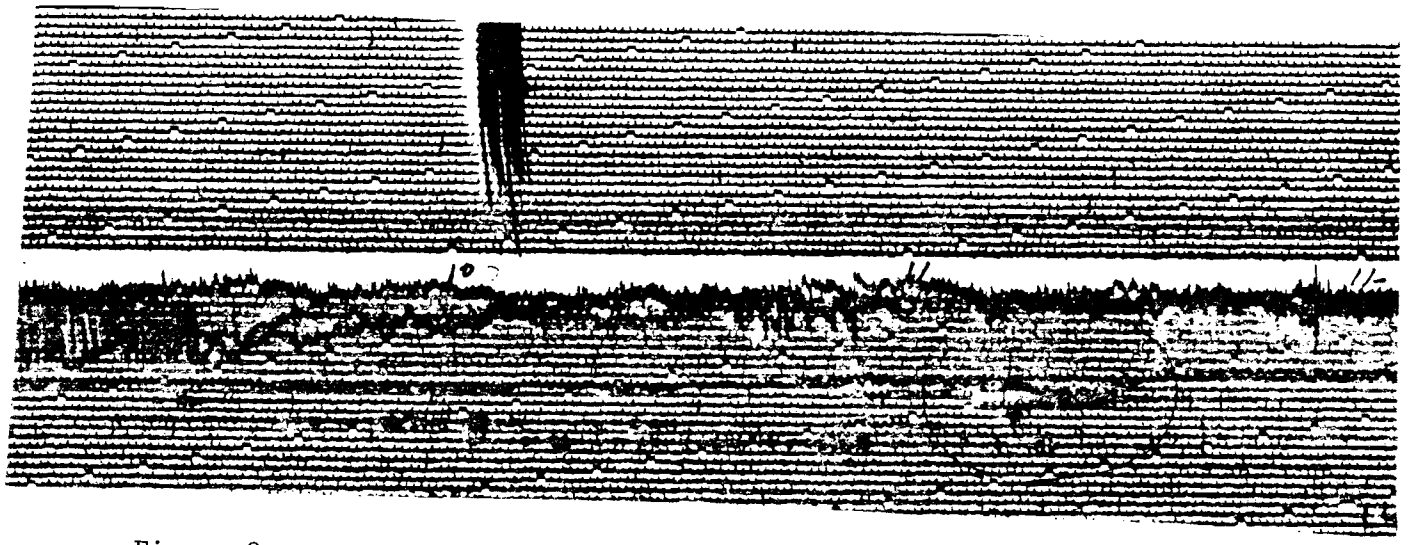


Figure 8. REG recording of Lake Sinclair event, Dec. 10 (I.D. No. 107)

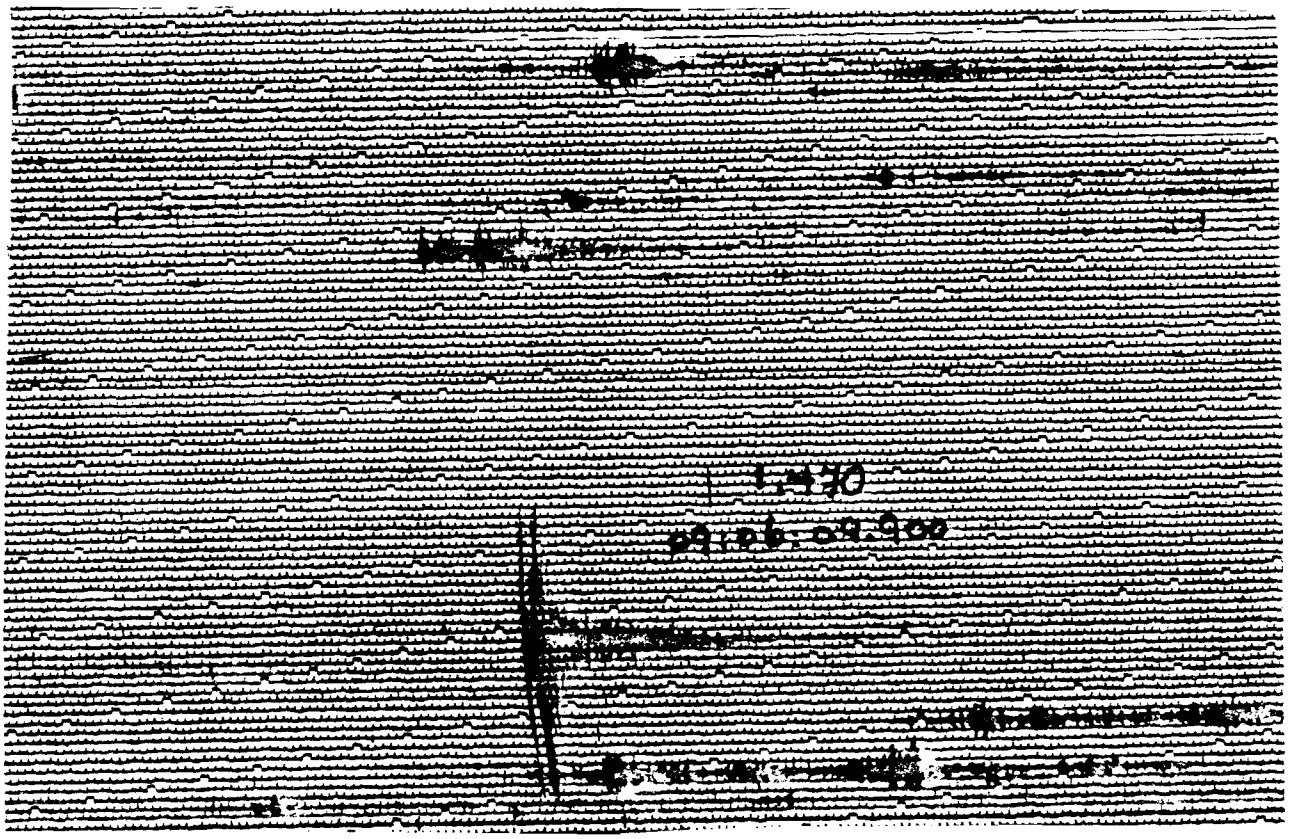


Figure 9. REG recording of Lake Oconee event, Dec. 16 (I.D. No. 108)

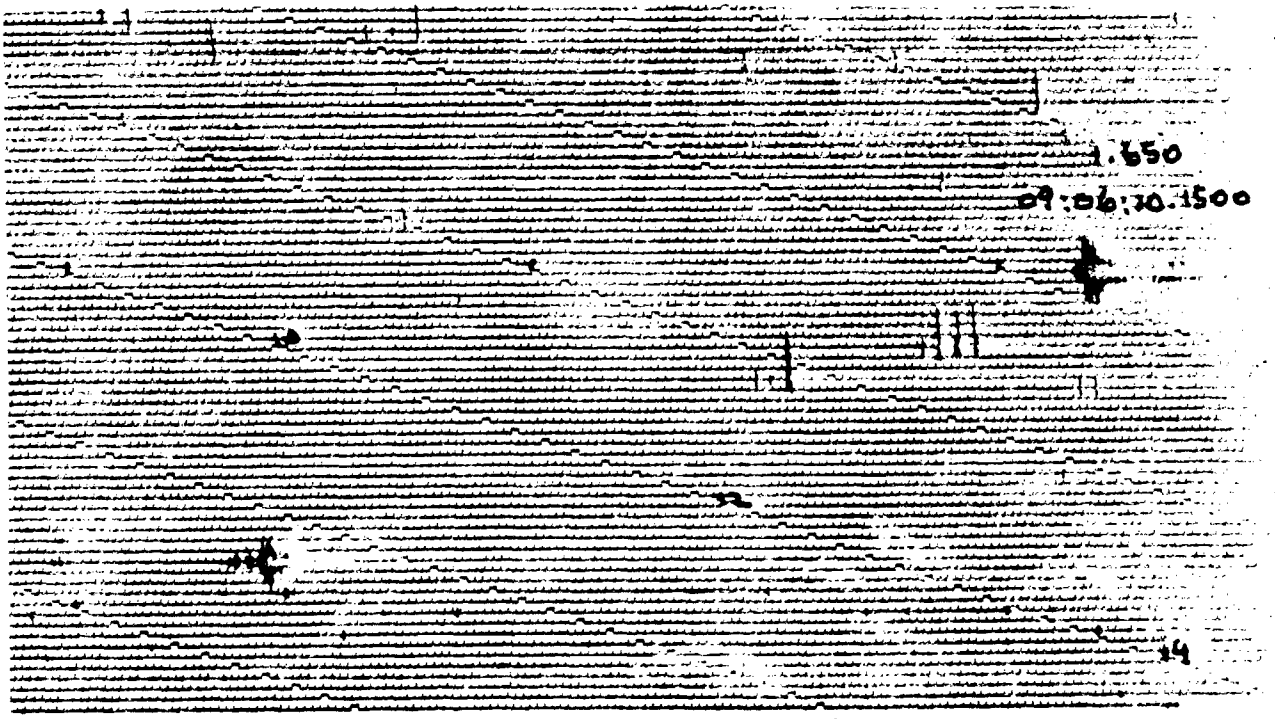


Figure 10. ETG recording of Lake Oconee event, Dec. 16 (I.D. No. 108)

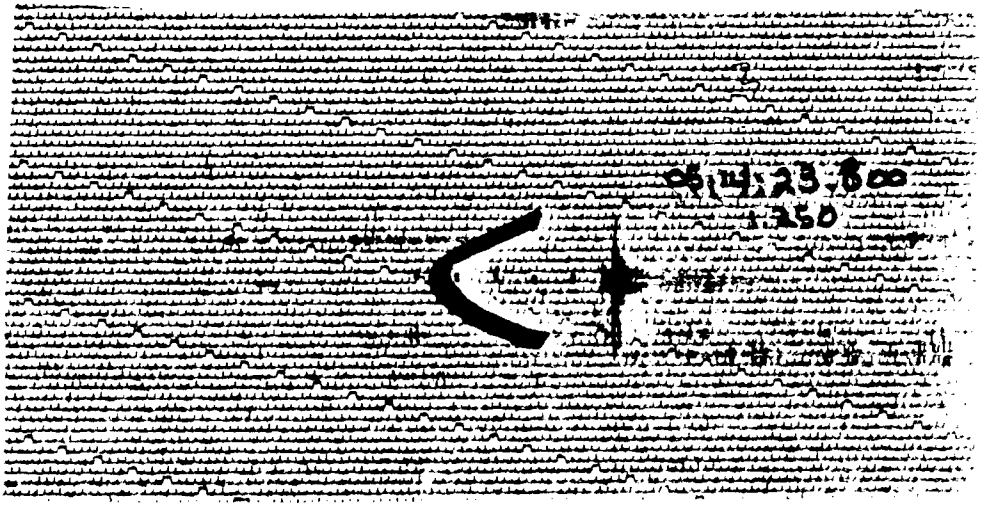


Figure 11. ETG recording of Lake Sinclair event, Jan. 20 (I.D. No. 109)

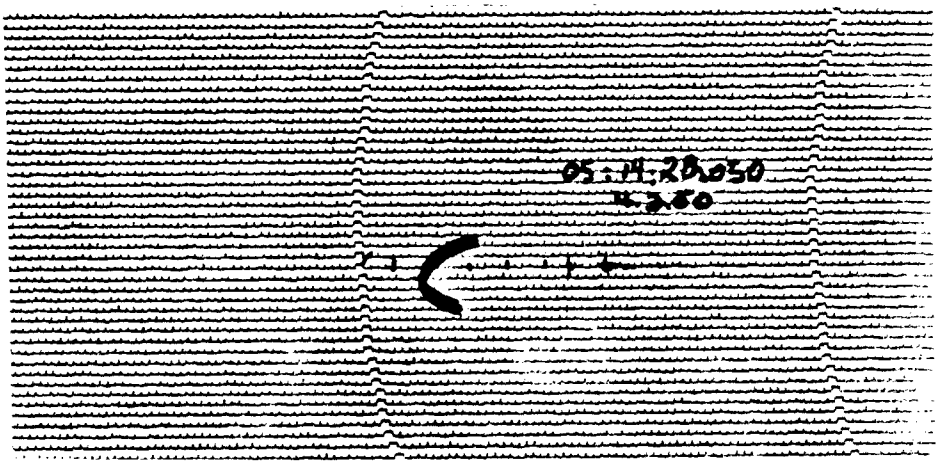


Figure 12. GBG recording of Lake Sinclair event, Jan. 20 (I.D. No. 109)

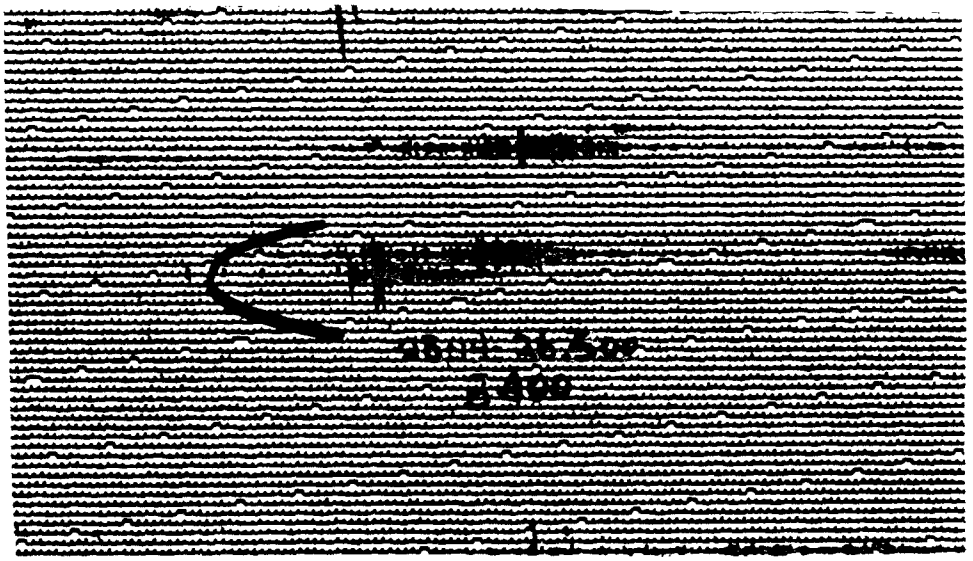


Figure 13. REG recording of Lake Sinclair event, Jan. 20 (I.D. No. 109)

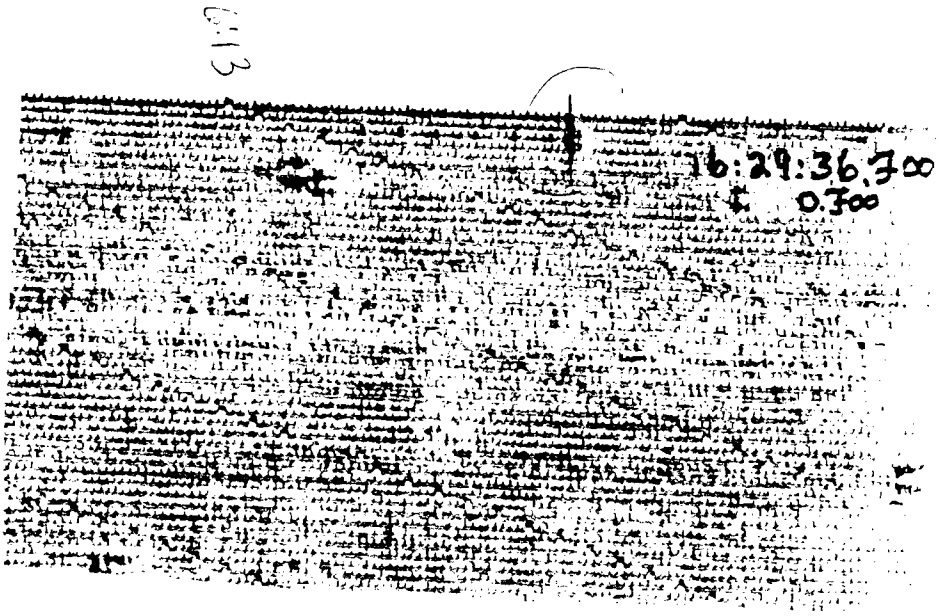


Figure 14. ETG recording of possible Lake Sinclair event, Jan. 26 (I.D. No. 110)

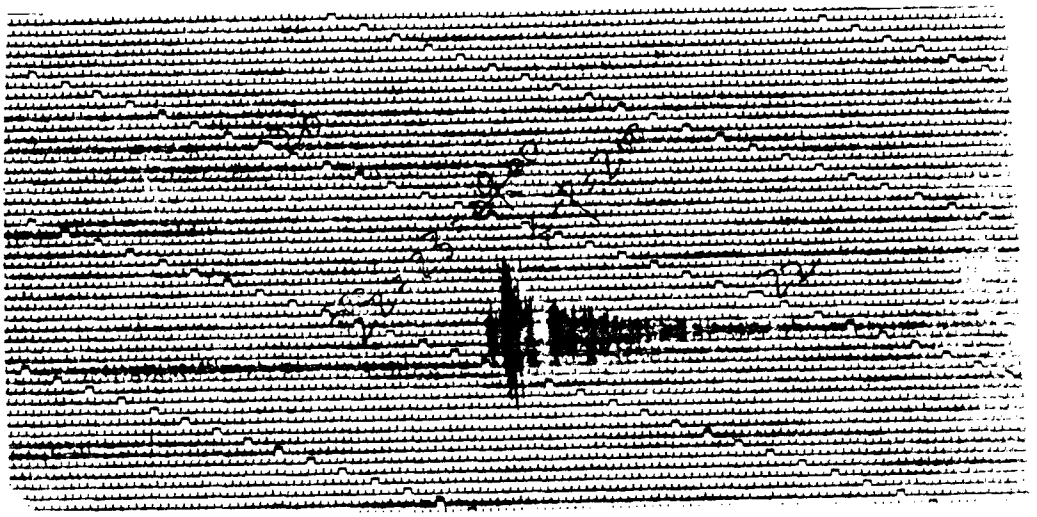


Figure 15. ETG recording of Lake Sinclair event, Jan. 30 (I.D. No. 111)

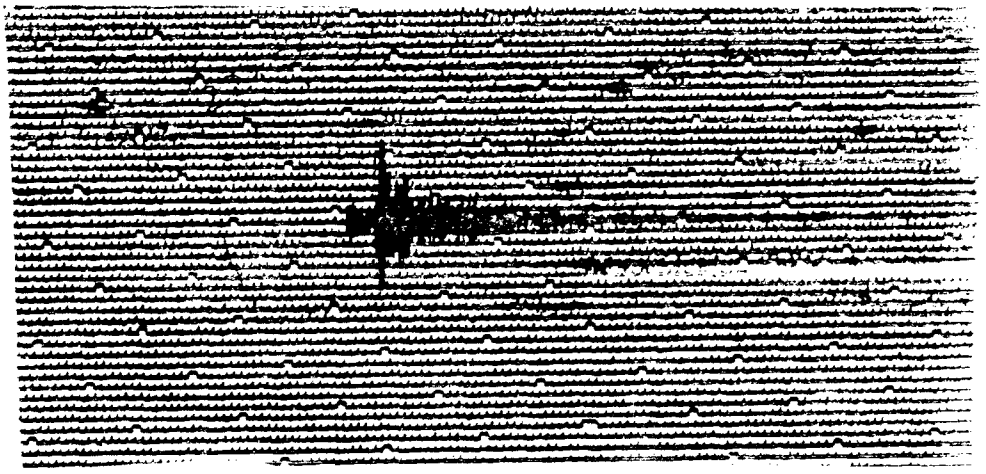


Figure 16. GBG recording of Lake Sinclair event, Jan. 30 (I.D. No. 111)

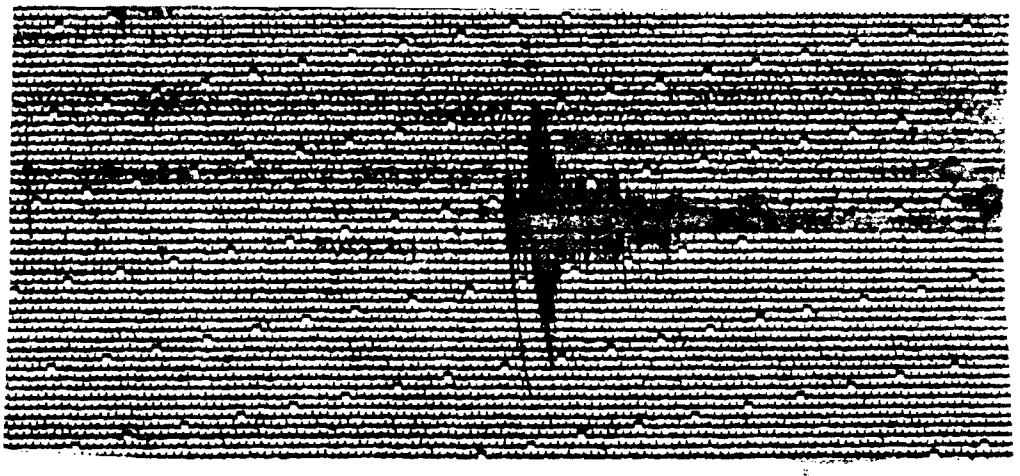


Figure 17. REG recording of Lake Sinclair event, Jan. 30 (I.D. No. 111)

Figure 18. ETG recording of Lake Sinclair event, Jan. 31 (I.D. No. 112)

Figure 19. REG recording of Lake Sinclair event, Jan. 31 (I.D. No. 112)

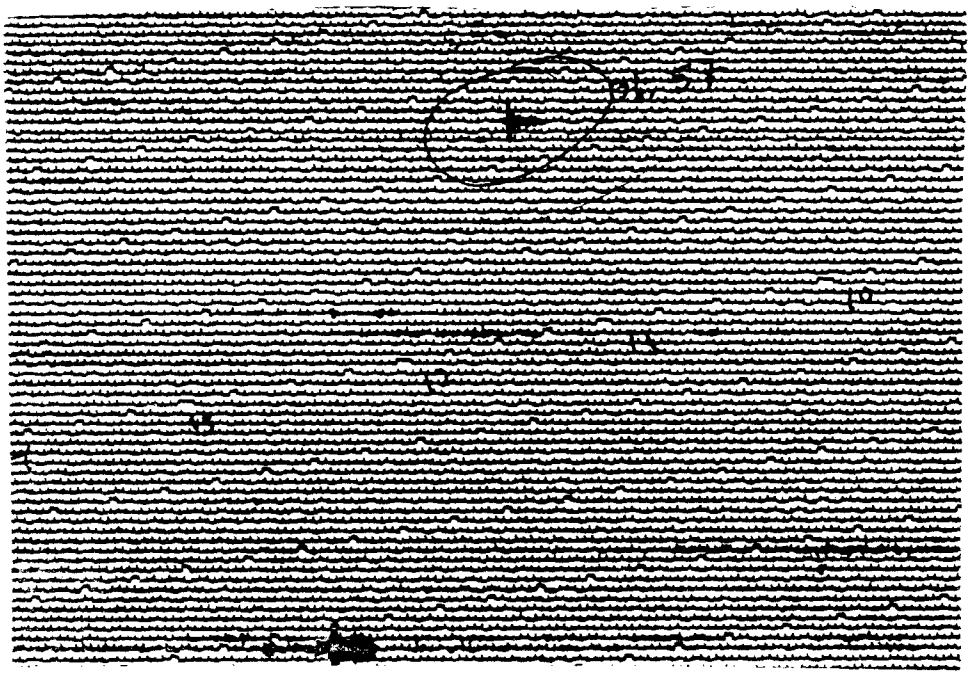


Figure 20. REG recording of Lake Oconee event, Feb. 15 (I.D. No. 113)

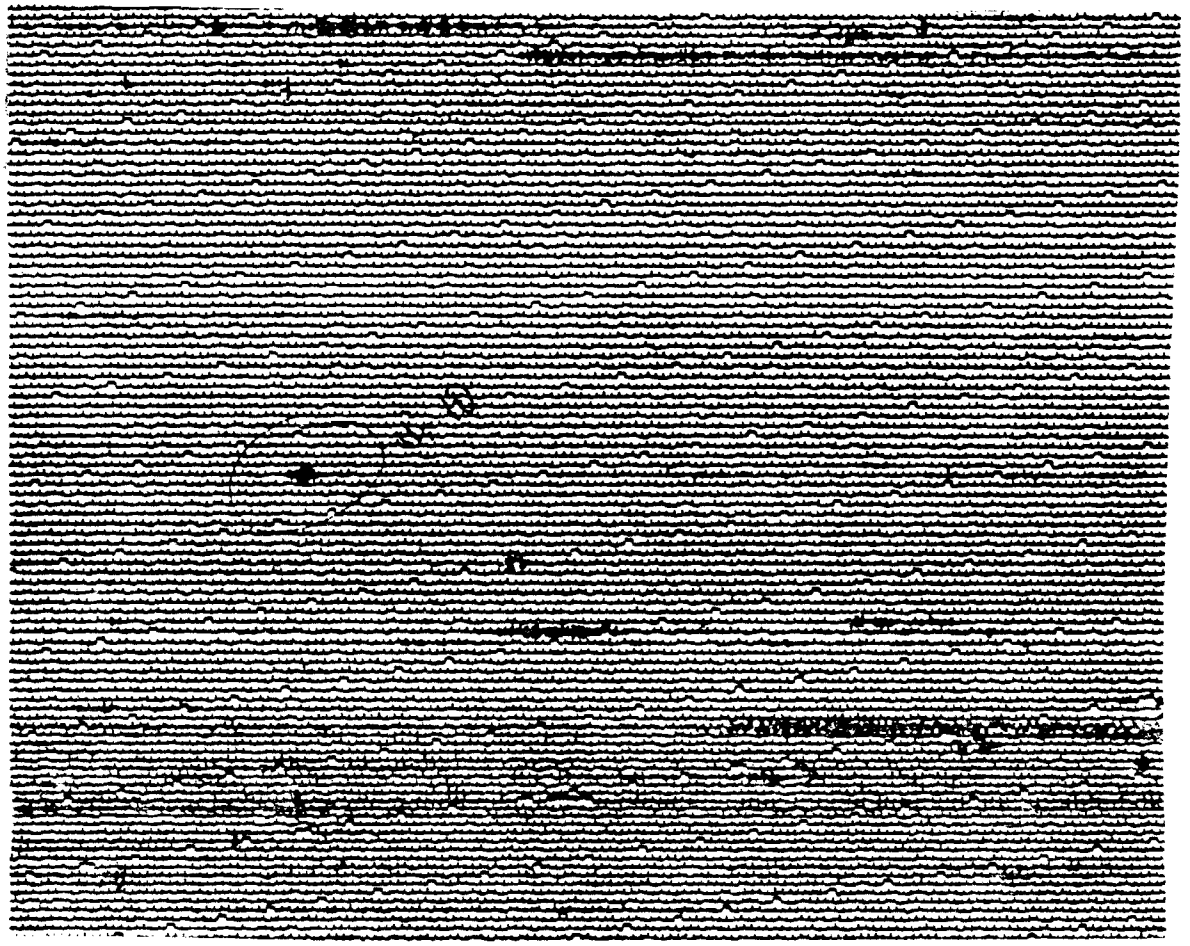


Figure 21. REG recording of Lake Oconee event, Feb. 15 (I.D. No. 114)

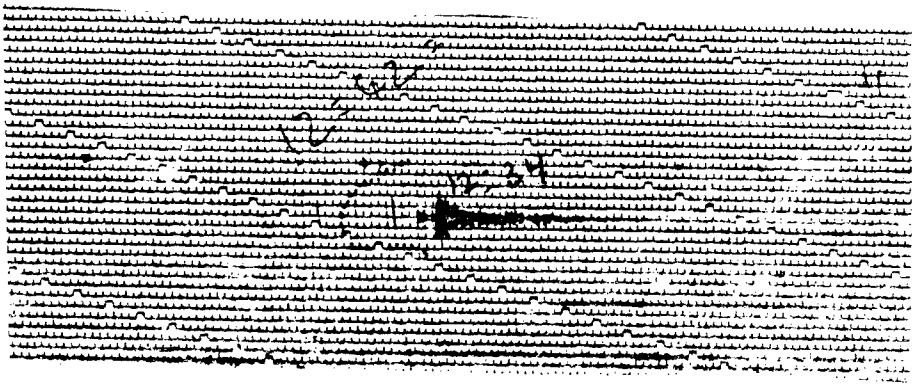


Figure 22. ETG recording of Lake Sinclair event, Feb. 24 (I.D. No. 115)

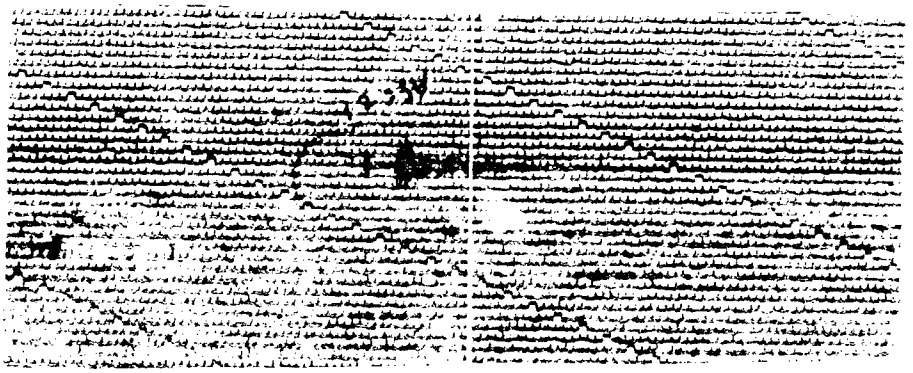


Figure 23. GBG recording of Lake Sinclair event, Feb. 24 (I.D. No. 115)

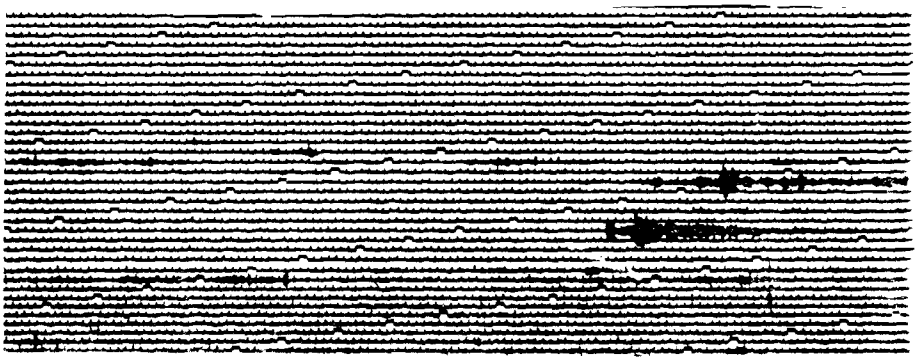


Figure 24. REG recording of Lake Sinclair event, Feb. 24 (I.D. No. 115)

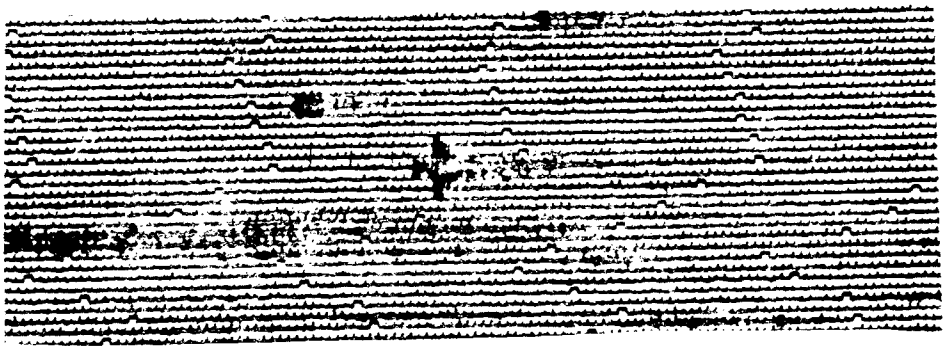


Figure 25. WDG recording of Lake Sinclair event, Feb. 24 (I.D. No. 115)

Figure 26. Lake Sinclair events during this recording period

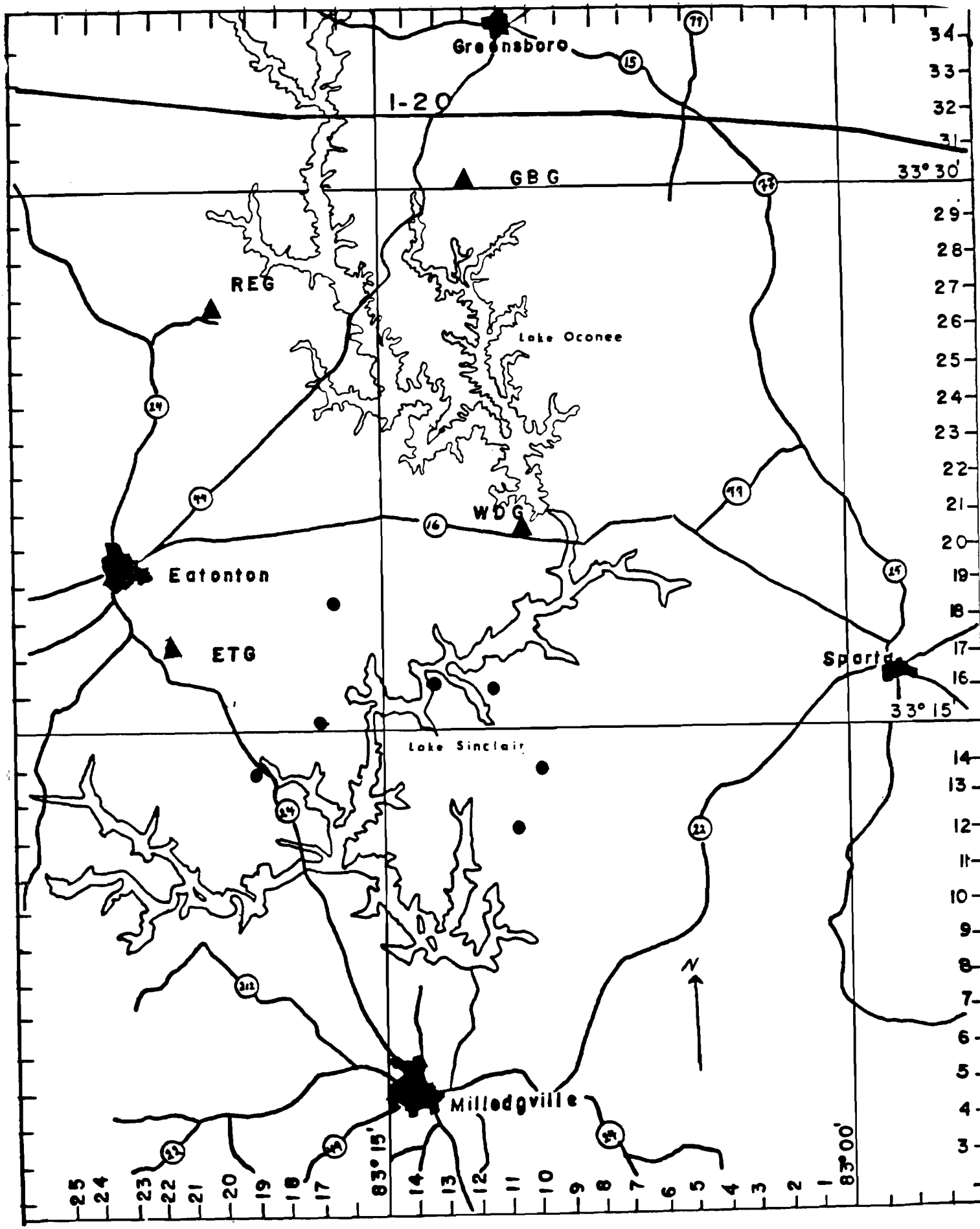


Figure 27. Lake Oconee events during this period

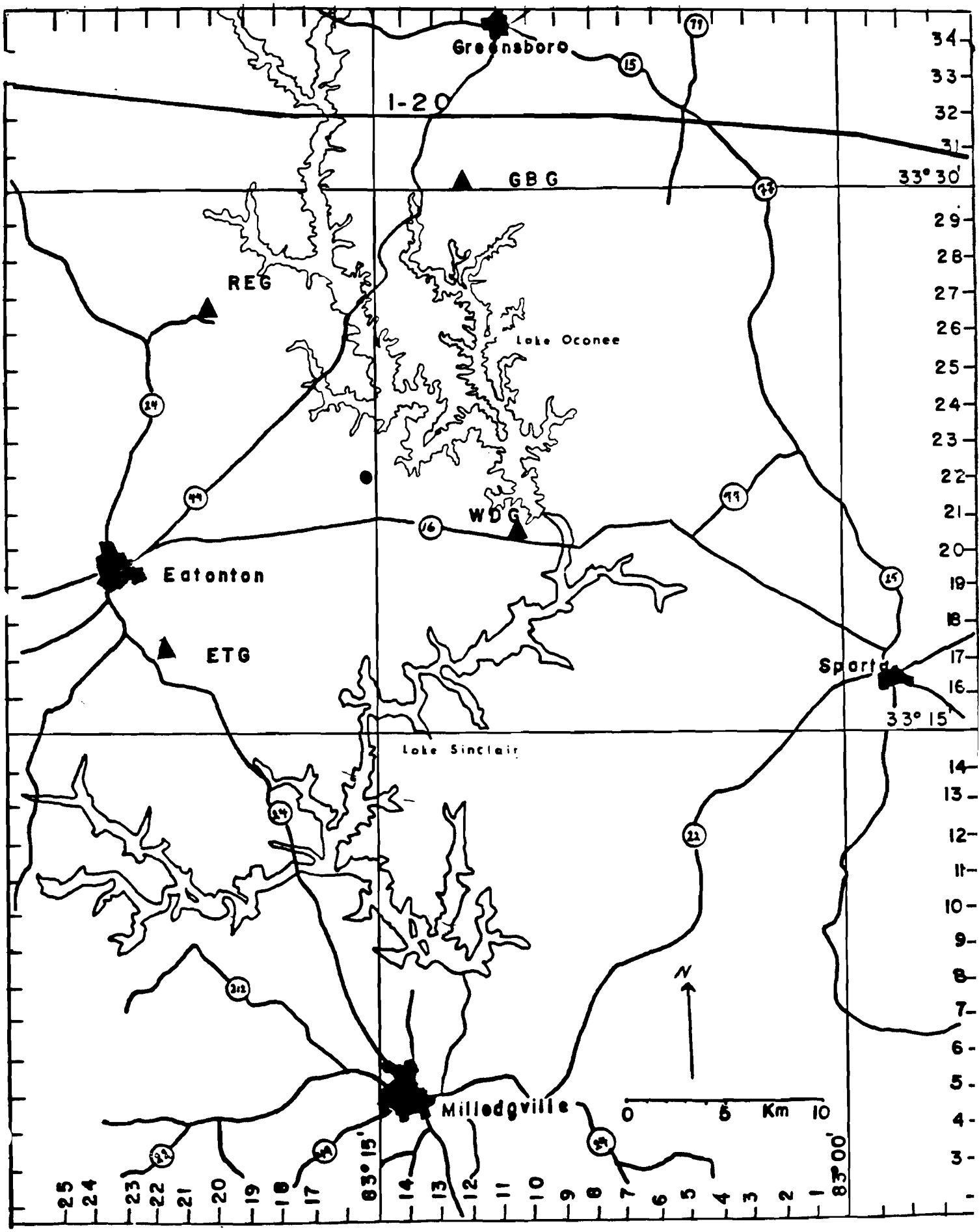
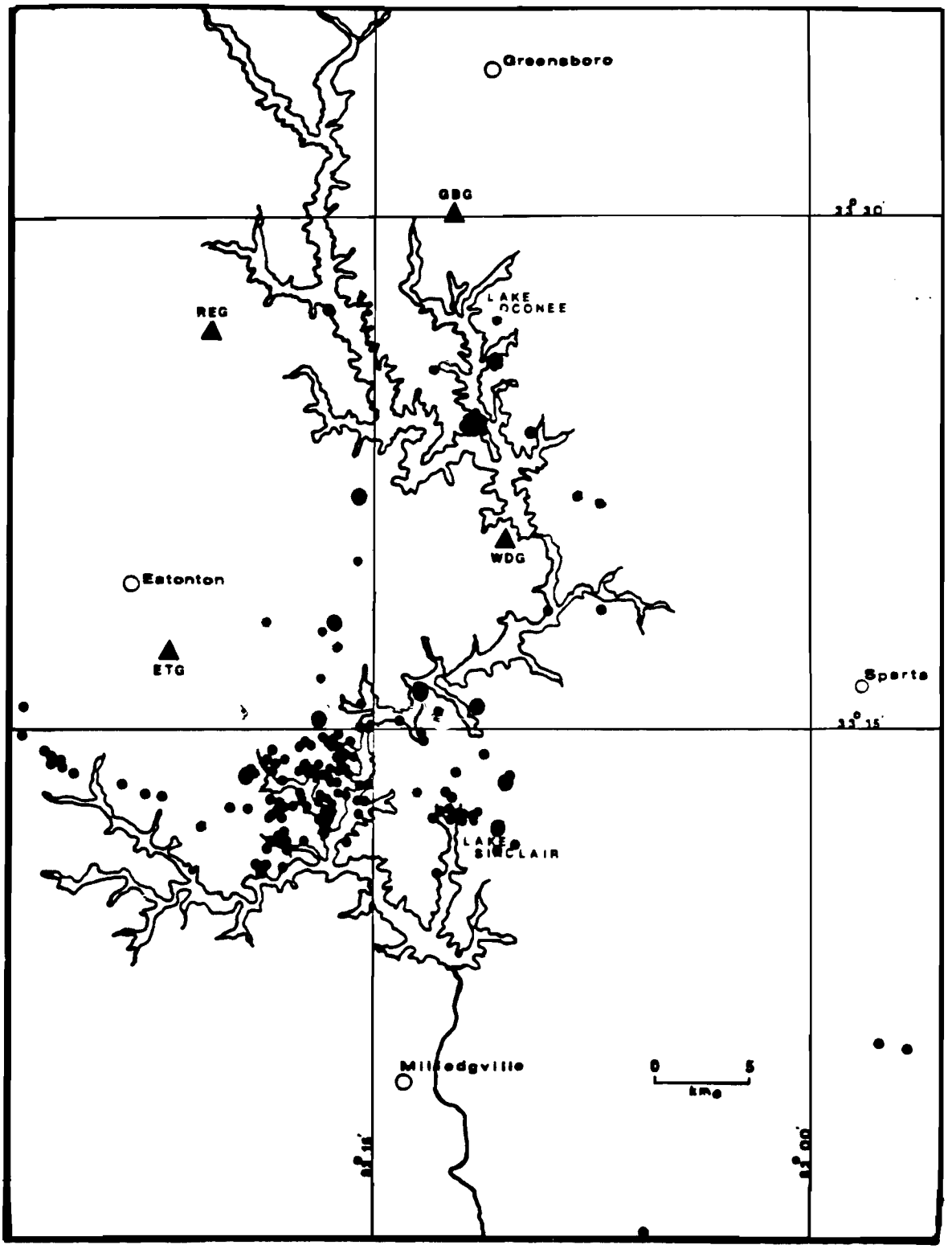


Figure 28. Cumulative distribution of events in both Lake Sinclair and Lake Oconee.



Wallace Dam Seismic Monitoring
Program's Recommendations and Summary of Results

Summary:

The Lake Sinclair vicinity has experienced both historical and contemporary seismic activity. The continuing low-level seismic activity with magnitude approaching 2.5 in the Lake Sinclair vicinity has been the primary source of data recorded on the Wallace Dam seismic net. However, the filling of the nearby Lake Oconee induced only 16 events, none with magnitude greater than 0.1. We recommend two years of continued monitoring in the Lake Oconee area. Because station WDG is adversely affected by pumping operations at Wallace Dam we recommend that WDG be terminated and that the net be modified. A single three-component station (the WDG instrumentation) should be located in the center of the Lake Oconee vicinity near the site of the few events induced by the impoundment of Lake Oconee. We recommend the new site be evaluated and installed during a six-month extension of the existing contract which should require no additional authorization of funds. Single station monitoring should continue for two years (February 1982 - January 1984) with a re-evaluation of monitoring requirements during the fall of 1983.

Seismicity:

Three seismic monitoring stations have operated in the Lake Oconee area and one in the Lake Sinclair area from June 1977 through the present, July 1981. The details of the seismicity recorded during the first three years are summarized in detail in a Master's thesis by Jerry Allison. The three Oconee stations were placed at the corners of a triangle centered on Lake Oconee in order to detect and locate events induced by the impoundment. The fourth station (ETG) was located near Eatonton, Georgia, and was funded by the NRC to provide better locations for events in the Lake Sinclair area.

By far, the most significant seismic activity within range of the net occurred near Lake Sinclair (see Figure 28). This activity was clustered about three separate locations. These centers of activity are respectively 10 km southwest of Eatonton, 15 km southeast of Eatonton and 20 km north of

Milledgeville. Seismic activity was detected in two other noteworthy locations: 25 km east of Milledgeville and 5 km southeast of Wallace Dam. The association of these events with impoundment of Lake Sinclair is not clear. Only one cluster is near the central portion of the reservoir. Three others are near the extreme ends of branches of the reservoir and one is significantly removed from any body of water.

Also, many physical characteristics such as spectra, b-value, and focal mechanism of the Lake Sinclair events resemble natural seismic activity more than induced seismicity. These reasons and the known historical activity suggest that the natural causative stresses dominate over activity which may be induced by Lake Sinclair.

The seismic activity observed in the Lake Oconee area occurred as a swarm, that is, a sequence of events with no distinct beginning, ending or dominant event. All events were less than magnitude 0.1 and hence were not always recorded well or were not easy to locate. These events occurred in the spring of 1980, almost one year after impoundment of Lake Oconee. During the spring of 1981 a few additional events were recorded but their low magnitude also makes them difficult to locate precisely. These events were induced by the filling of Lake Oconee. However, neither the number of events nor the current area of activity is typical of reservoir-induced seismicity. Instead, a seasonal variation in activity, apparently unrelated to water level, was observed.

The current understanding of reservoir-induced seismicity associates earthquakes with zones which both permit access of the water to deeper rocks and which are under a tensional or strike slip tectonic environment. For example, an area of normal faulting is likely to be susceptible to triggering by reservoir impoundment but only if the water can penetrate to the fault zone. Hence, in Lake Oconee and in Lake Sinclair the current activity may relate to near-surface rock units which permit penetration by the waters of the reservoirs. The activity near Sinclair and Oconee should be expected to continue and attenuate only when water is completely closed off from the rocks of the earth's crust surrounding the reservoir. As this process is at present poorly understood and as activity has reoccurred in the Oconee area during the spring of 1981, two additional years of monitoring are recommended to allow further evaluation of the potential extent of the Oconee

seismicity. Such monitoring should allow location of the events, either by three station locations or by three-component analysis.

Recommendations:

1. First, we recommend that a six-month unfunded extension to the Wallace Dam seismic monitoring net be authorized as soon as possible. During this six-month period we will submit a renewal proposal and investigate field sites. Money intended to cover travel to maintain field sites was not used because the activity level was less than anticipated. We will transfer that travel money to cover phone line charges for six months.

2. Because minor activity has continued in the Lake Oconee area and its relation to the reservoir is unclear, we recommend two additional years of seismic monitoring. The primary objective will be to document the rate of activity and determine whether it is increasing or decreasing. A secondary objective, particularly if the seismicity increases, will be to evaluate the possible association of events with particular geologic units.

3. Station WDG is adversely affected by the power generation operation at Wallace Dam. The high level of seismic background noise during power generation periods prevents useful recording. Hence, we recommend that station WDG be moved or terminated at the end of the six-month extension.

Options for Continued Monitoring:

There are many feasible options if the possibilities of RF transmission coupled with use of Georgia Power microwave transmission system (as used at Rock Mountain) are to be considered. The breakeven time for such a system, however, is just under two years when compared to a total phone line system such as exists. These possibilities should be discussed with Georgia Power personnel so that a cost-effective project can be designed. Thus, the options available reduce to four, which in decreasing complexity are:
1. Increase system to six stations around Lake Oconee; 2. Move WDG to the central portion of the reservoir; 3. Move WDG to the central portion of the reservoir and eliminate GBG and REG; and, 4. Terminate recording.

1. The first option, an expanded net, would be appropriate only if a

significant level of activity were to be triggered by Lake Oconee. We do not recommend this option now since the current level of seismicity is very low. Should the seismic activity increase by about two orders of magnitude (that is, should events of magnitude greater than two occur) in the Lake Oconee vicinity, an increase in the number of stations would be recommended.

2. The second option would be to move station WDG to a quiet site further north and closer to the center of the reservoir. This would retain the advantage of three station locations capability as well as the three component station WDG.

3. The third option is to retain only a single (three-component) new site which would be centrally located in the Lake Oconee area. Preferably this site would be close to the site of the few events that have occurred this year or last spring. The single three-component site would not be as capable in providing locations and it would be more susceptible to down time and lost coverage. The primary advantage of this option would be in reduced phone line charges; the reduced charges (about $4,000 per year) could be used more efficiently if reserved for field monitoring during periods of increased activity. This option would free the other stations for use elsewhere if desired.

4. The termination of recording is not recommended at this time because the trend in the level of activity (increasing or decreasing) has not been established.

The Lake Sinclair activity suggests a fifth option which is only indirectly related to the Oconee reservoir seismicity. The Lake Sinclair activity is dispersed in three or more clusters. However, the locations of the events were determined from stations near Lake Oconee and are not as precise as they would be if an array were centered about Lake Sinclair. The fifth option would be to install a six-station array about Lake Sinclair so that the earthquakes could be located more precisely. The objective would be to use these locations and geological reconnaissance to identify the rock units which are most likely to generate earthquakes when near a reservoir. The monitoring would be for about three years' duration.

Future Plans:

During the first part of the summer or as soon as possible, proposed budgets for the second and third options will be prepared. We also hope to meet with Georgia Power representatives to provide input into the design of the systems so that Georgia Power's needs and objectives can be best satisfied. At this time, either option two or three would provide sufficient data to maintain surveillance of the seismicity.

GEORGIA INSTITUTE OF TECHNOLOGY
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22 February 1982

Major H. Thompson, Jr.
Georgia Power Company
P. O. Box 4545
Atlanta, GA 30302

Subject: Quarterly Letter Report Number 19, Covering the Period 1 March to 31 May 1981

Re: Seismic Monitoring Near Wallace Dam, Georgia

Dear Sir:

The total cumulative percentage recording coverage for the Wallace Dam net for the period of 1 March to 31 May 1981 was 99.9. This corresponds to a cumulative percentage of 99.7, 100, and 100 for the months of March, April, and May, respectively.

There was no seismic activity at Lake Oconee during the recording period.

Seven events were recorded from Lake Sinclair along with a number of regional events and blasts. The Lake Sinclair event of 4 April 1981 with mb = 2.7 was recorded regionally. Detailed information and signatures for the four Wallace Dam stations, and the cumulative distribution of all events for both areas are enclosed.

Respectively submitted,

Leland T. Long
Professor

LTL+ap

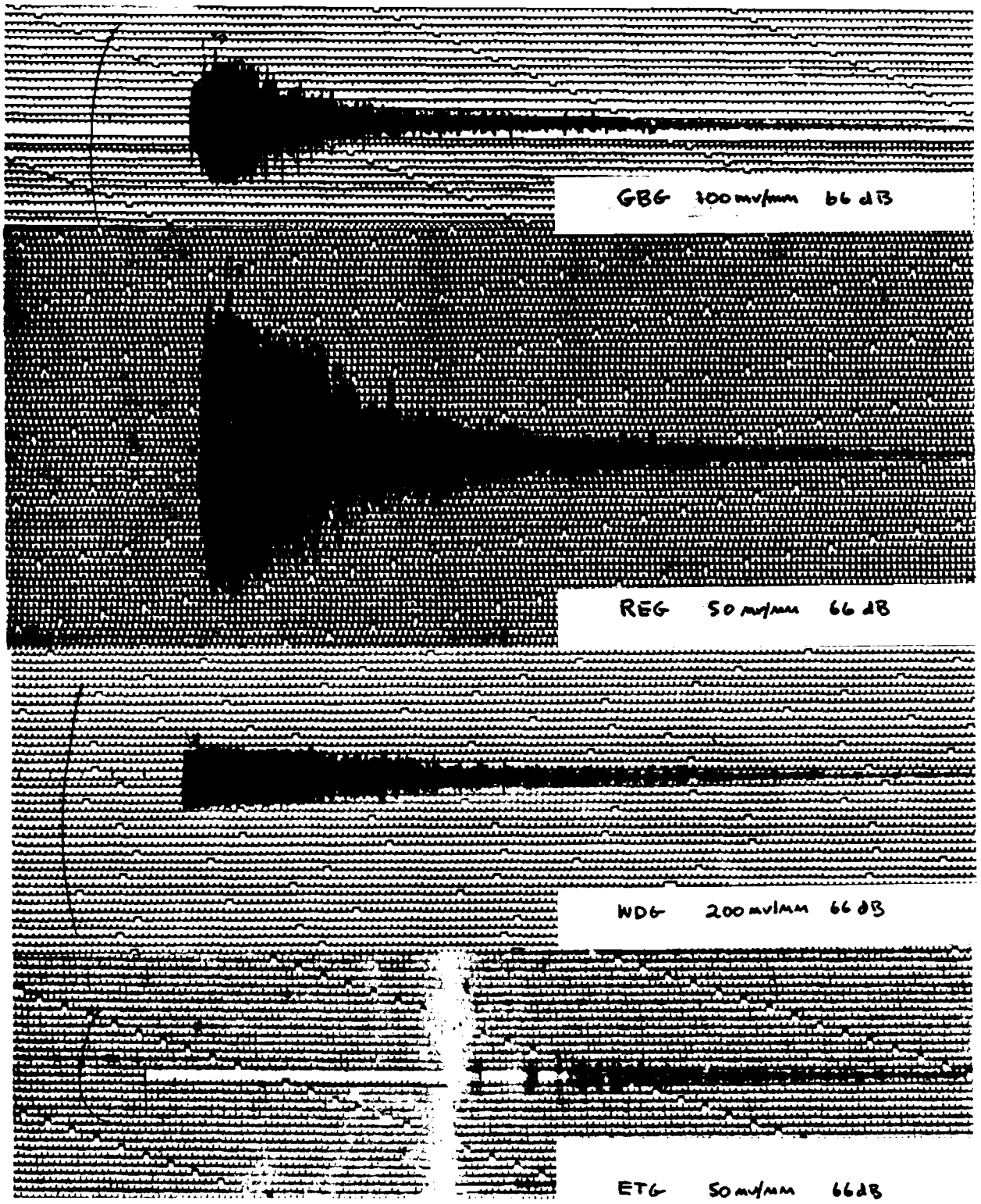
Enclosure

AREA	ID NO.	DATE	ORIGIN TIME	LATITUDE	LONGITUDE	
		LAKE SINCLAIR EVENT				
REG	163	81/04/04	09:19:38.26	33.2540	83.2091	
		GBG PG	09:19: 43.400		+/-	.200
		GBG S	09:19: 47.100		+/-	.300
		ETG PG	09:19: 41.100		+/-	.200
		REG PG	09:19: 42.900		+/-	.200
		REG S	09:19: 46.300		+/-	.300
		WDG PG	09:19: 40.800		+/-	.500
		WDG S	09:19: 42.400		+/-	.500
		SINCLAIR				
WDP	167	81/03/03	15:04:58.27	33.1822	83.2839	
		ETG PLG	15:04: 1.000		+/-	.200
		ETG S-P	00:00: 2.000		+/-	.200
		WDG PLG	15:04: 2.000		+/-	.200
		WDG S-P	00:00: 3.000		+/-	.200
		REG PLG	15:04: 3.500		+/-	.200
		REG S-P	00:00: 3.500		+/-	.200
		SINCLAIR				
WDP	168	81/03/05	06:20:26.56	33.2561	83.4577	
		ETG PLG	06:20: 29.000		+/-	.200
		ETG S-P	00:00: 2.000		+/-	.200
		WDG PLG	06:20: 31.500		+/-	.200
		WDG S-P	00:00: 3.000		+/-	.200
		GBG PLG	06:20: 32.500		+/-	.200
		GBG S-P	00:00: 5.000		+/-	.200
		REG PLG	06:20: 31.000		+/-	.200
		REG S-P	00:00: 3.000		+/-	.200
		SINCLAIR?				
WDP	169	81/03/08	04:33:46.30	33.3633	83.4833	
		REG PLG	04:33: 49.500		+/-	.200
		REG S-P	00:00: 3.000		+/-	.200
		ETG PLG	04:33: 49.500		+/-	.200
		ETG S-P	00:00: 2.000		+/-	.200
		WDG PLG	04:33: 51.500		+/-	.200
		WDG S-P	00:00: 3.000		+/-	.200
		GBG PLG	04:33: 51.000		+/-	.200
		GBG S-P	00:00: 4.000		+/-	.200
		SINCLAIR				
WDP	170	81/03/14	11:30:45.27	33.2034	83.2164	
		REG PLG	11:30: 50.500		+/-	.200
		REG S-P	00:00: 3.700		+/-	.200
		ETG PLG	11:30: 48.300		+/-	.200
		GBG PLG	11:30: 51.000		+/-	.200
		GBG S-P	00:00: 4.500		+/-	.200

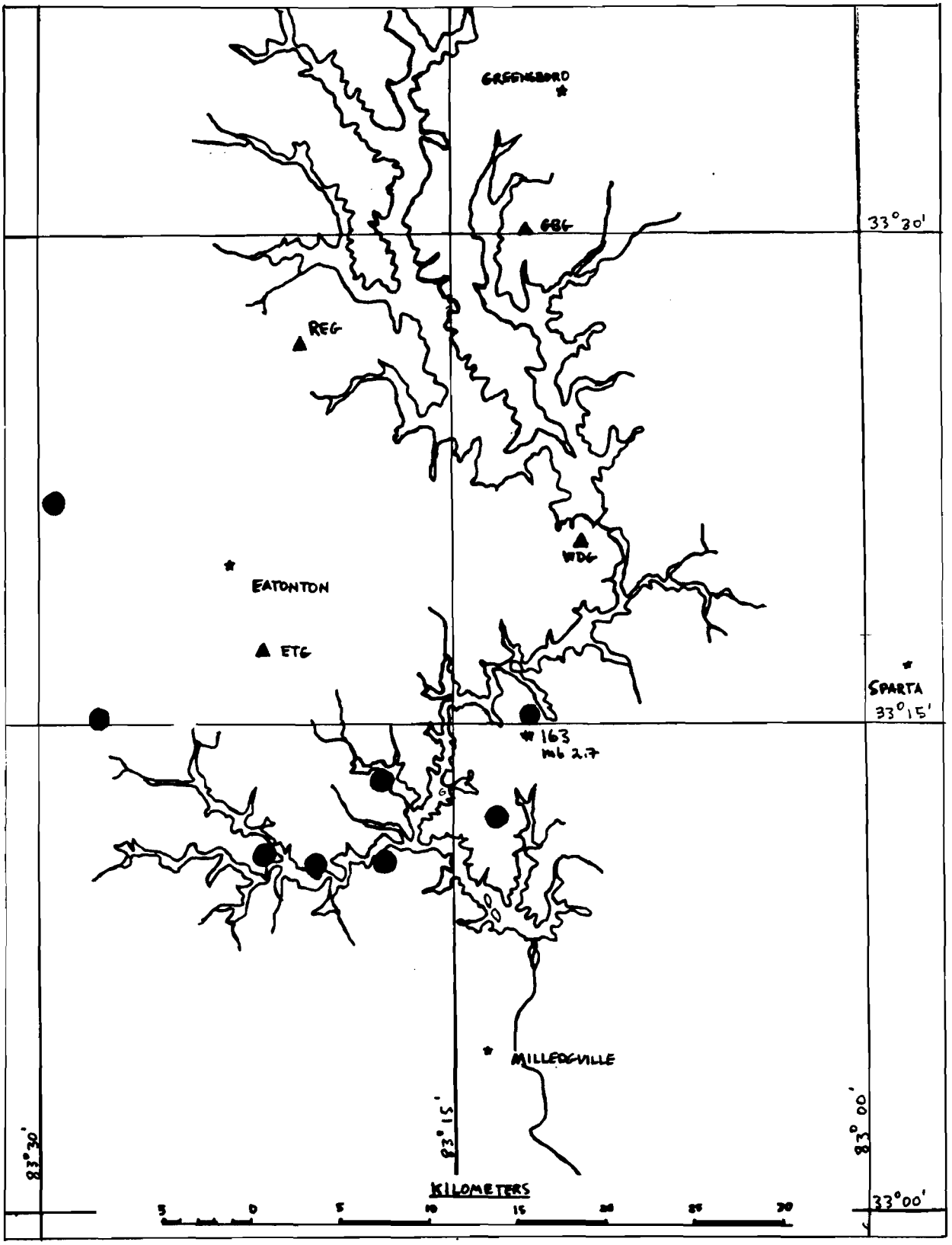
WDP

WDP	171	81/03/27	08:29:	3.92	33.2929	82.9428		
		ETG	PLG	08:29:	11.000	+/-	.200	
		ETG	S-P	00:00:	5.000	+/-	.200	
		GBG	PLG	08:29:	10.000	+/-	.200	
		GBG	S-P	00:00:	5.000	+/-	.200	
		REG	PLG	08:29:	10.500	+/-	.200	
		REG	S-P	00:00:	5.000	+/-	.200	
	JACKSON LAKE							
WDP	172	81/04/28	16:45:	54.13	33.2143	83.8335		
		ETG	PLG	16:45:	2.000	+/-	.200	
		ETG	S-P	00:00:	6.500	+/-	.200	
		WDG	PLG	16:45:	5.000	+/-	.200	
		WDG	S-P	00:00:	8.000	+/-	.200	
		REG	PLG	16:45:	3.300	+/-	.200	
		REG	S-P	00:00:	7.000	+/-	.200	
	JACKSON LAKE							
WDP	166	81/05/04	19:05:	1.67	33.1286	83.7303		
		ETG	S-P	00:00:	5.400	+/-	.200	
		GBG	S-P	00:00:	8.500	+/-	.200	
		WDG	S-P	00:00:	8.500	+/-	.200	
		CH5	S-P	00:00:	18.500	+/-	.500	
		EP1	S-P	00:00:	18.000	+/-	.500	
		ETG	PLG	19:05:	8.000	+/-	.200	
		GBG	PLG	19:05:	13.000	+/-	.200	
		WDG	PLG	19:05:	11.500	+/-	.200	
		CH5	PLG	19:05:	27.000	+/-	.500	
		EP1	PLG	19:05:	27.000	+/-	3.000	
	LAKE SINCLAIR							
WDP	52	81/05/25	11:46:	41.39	33.2221	83.2862		
		ETG	PLG	11:46:	43.200	+/-	.200	
		ETG	S-P	00:00:	1.600	+/-	.200	
		WDG	PLG	11:46:	44.600	+/-	.200	
		WDG	S-P	00:00:	2.400	+/-	.200	
		GBG	PLG	11:46:	47.200	+/-	.200	
		GBG	S-P	00:00:	3.800	+/-	.200	
	SINCLAIR							
WDP	25	81/05/27	20:04:	36.65	33.1789	83.3233		
		REG	PLG	20:04:	41.800	+/-	.200	
		REG	S-P	00:00:	3.600	+/-	.200	
		ETG	PLG	20:04:	39.200	+/-	.200	
		ETG	S-P	00:00:	2.000	+/-	.200	
		GBG	S-P	00:00:	4.800	+/-	.200	
		WDG	S-P	00:00:	3.200	+/-	.200	
		GBG	PLG	20:04:	43.200	+/-	.200	
	SINCLAIR							
WDP	49	81/05/27	20:26:	12.79	33.1853	83.3553		
		REG	PLG	20:26:	17.800	+/-	.200	
		REG	S-P	00:00:	3.600	+/-	.200	
		ETG	PLG	20:26:	15.200	+/-	.200	
		ETG	S-P	00:00:	2.000	+/-	.200	
		WDG	PLG	20:26:	17.400	+/-	.200	
		WDG	S-P	00:00:	3.200	+/-	.200	
		GBG	PLG	20:26:	19.200	+/-	.200	
		GBG	S-P	00:00:	4.800	+/-	.200	

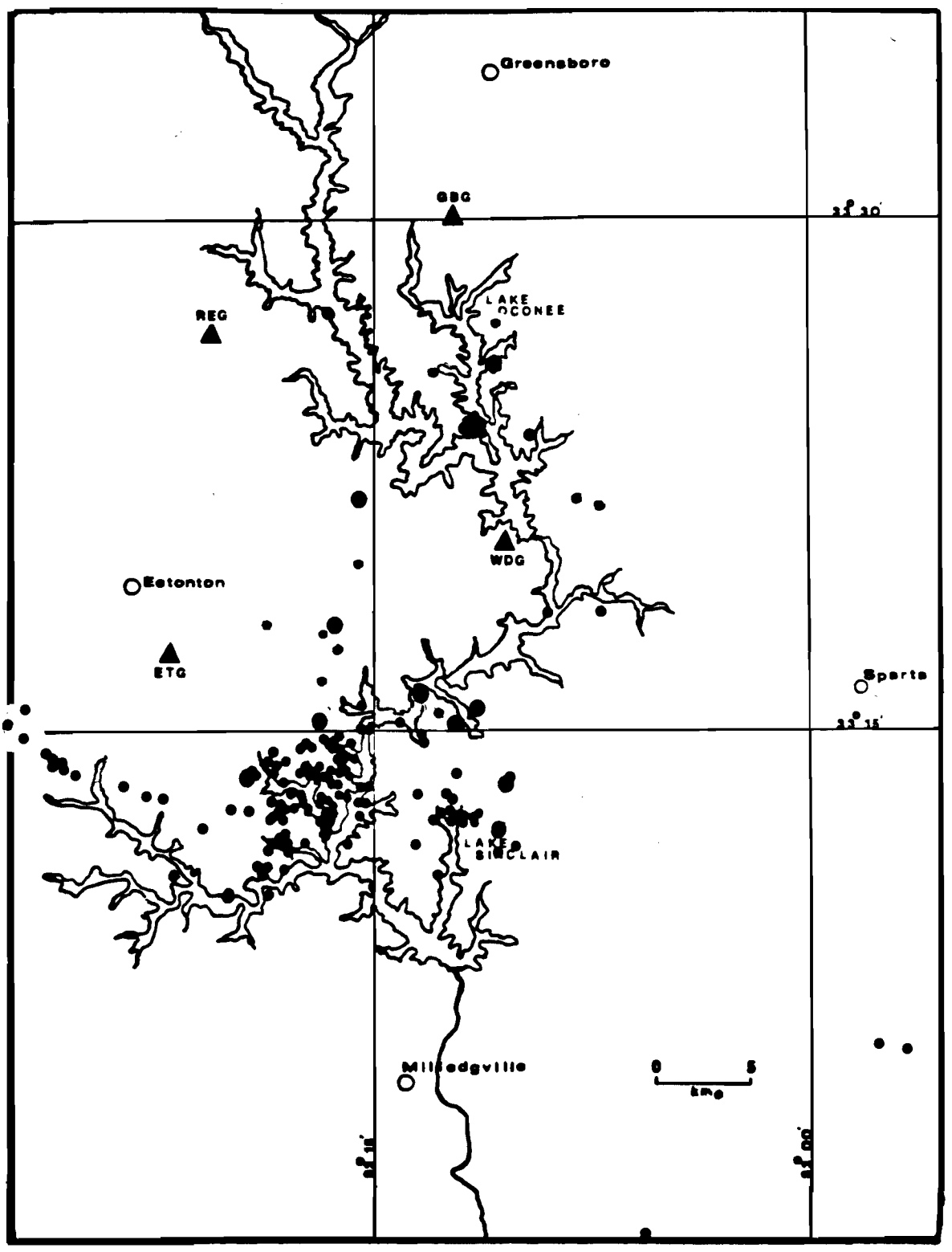
4 APRIL 1981 LAKE SINCLAIR EVENT MD=2.7



EVENTS DURING THE PERIOD OF 1 MARCH TO 31 MAY 1982



Cumulative distribution of events in both Lake Sinclair and Lake Oconee.



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March 23, 1982

Major H. Thompson, Jr.
Georgia Power Company
P. O. Box 4545
Atlanta, GA 30302

Subject: Letter Report Number 20, Covering the Period 1 June 1981 to 22 January 1982 (Project Completion and Beyond)

Re: Seismic Monitoring Near Wallace Dam Georgia

Dear Sir:

The recording coverage for the Wallace Dam net for the period 1 June 1981 to 22 January 1982 was 87%. A monthly breakdown of coverage and termination dates for station operation are tabulated in Table 1. Lost recording resulted primarily from telephone communication failures particularly during the last two months. Communication expenses and record evaluations during this period were funded in part by the Nuclear Regulatory Commission.

No seismic activity was detected or confirmed for Lake Oconee area during this reporting period.

The suspected Lake Sinclair activity consisted of two earthquakes which could be located and 22 small events of similar character. The latter were recorded on too few stations to permit location. The locations of the two are listed in Table II. Copies of the events are given in Figure III. Cumulative seismic activity for the total recording period is illustrated in Figure IV.

Although no events were located in the Lake Oconee area during this final report period, minor induced seismic activity was detected ("Special Report," 28 April 1978). There has been sporadic evidence of continued activity at marginally detectable levels, which are equivalent to magnitudes less than 0.0. However, in comparison with other examples of induced seismicity, such as Lake Jocassee and Monticello reservoir, Lake Oconee is not an example of significant induced seismicity. At this time, we see no reason to expect larger events to be induced. However, time could be a critical factor and we recommend, as stated earlier, ("Wallace Dam Seismic Monitoring Program's Recommendations and Summary of Results," June 1981) that consideration be given to maintaining a single monitoring station. One station would allow the detection of any increase in seismic activity. At present, alternate sources of monitoring for events in the Lake Sinclair and the Wallace Dam area (stations ATL and CHRA array) are

too far away to detect low levels of seismic activity.

This will be the final project report, in accordance with our records for reporting requirements. Please notify us if we are in error or if you are lacking any reports. Site restoration is in progress. All the records will remain on file for use in our research or for future studies.

We appreciate having been given the privilege of working with you on this project. If you need any further analysis or monitoring, we will be glad to discuss it with you.

Respectfully submitted,

L. Timothy Long

LTL+ap

Table I. Data Coverage and Termination Dates.

	Coverage	Last Day of Recording
June	99.2%	5 July 1981 - ETG
July	100.0%	26 September 1981 - GBG
August	85.6%	26 September 1981 - WDL
September	79.7%	22 Janaury 1982 - REG
October	70.7%	
November	82.6%	
December	96.7%	
January	81.8%	

FIGURE III

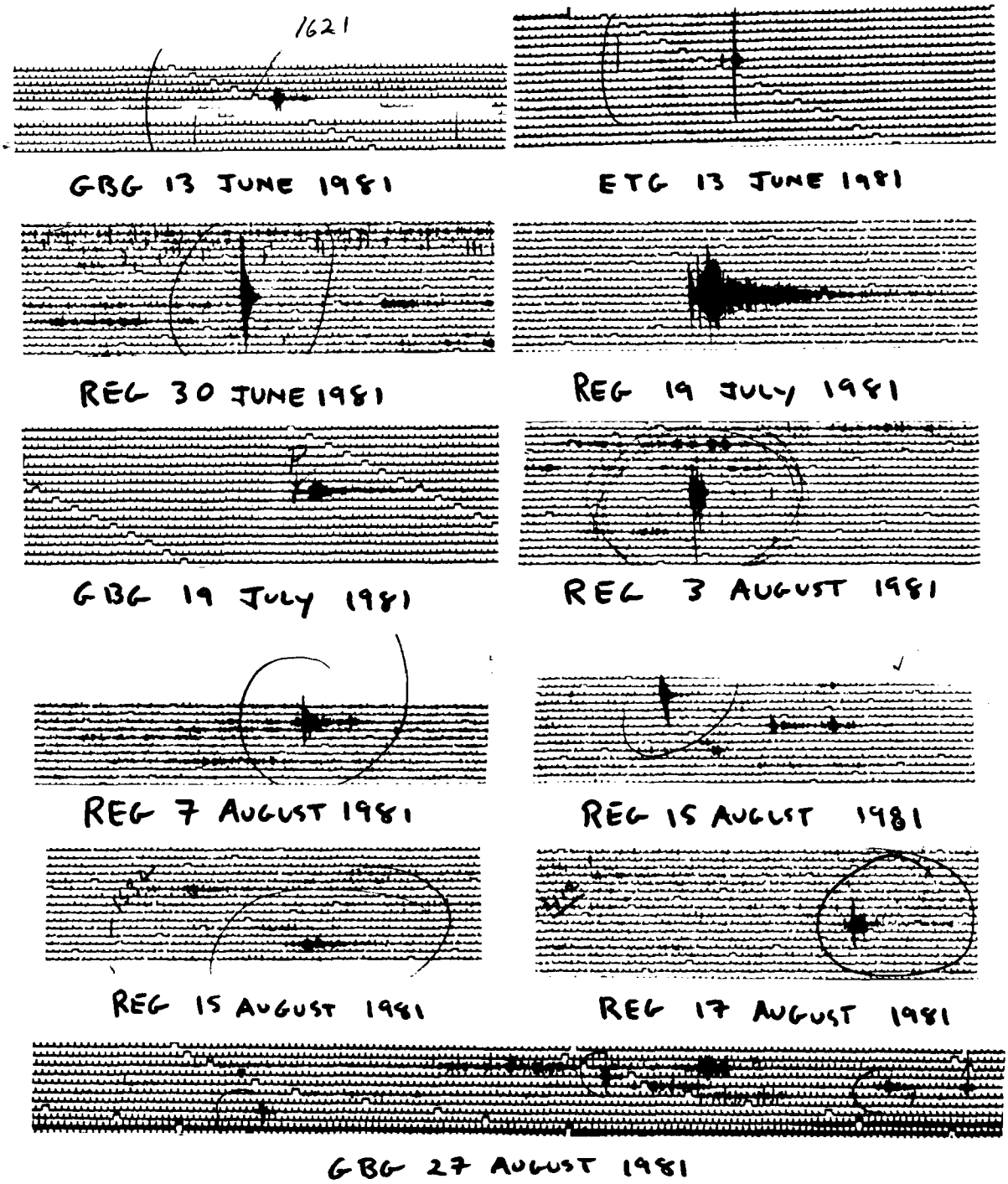
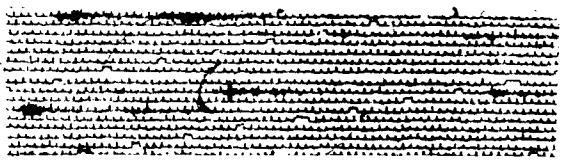
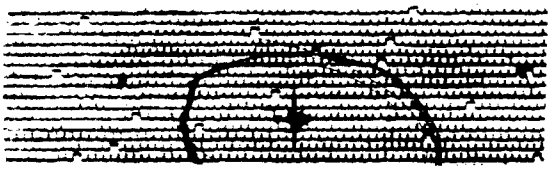

1621
GBG 13 JUNE 1981
ETG 13 JUNE 1981
REG 30 JUNE 1981
REG 19 JULY 1981
GBG 19 JULY 1981
REG 3 AUGUST 1981
REG 7 AUGUST 1981
REG 15 AUGUST 1981
REG 15 AUGUST 1981
REG 17 AUGUST 1981
GBG 27 AUGUST 1981

FIGURE III (contd.)



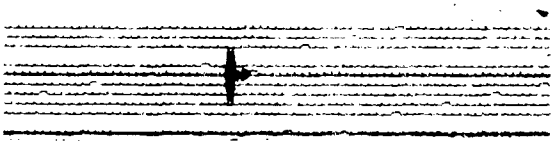
REG 27 AUGUST 1981



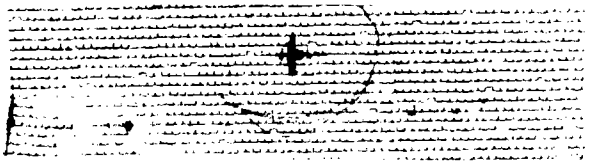
CBC 2 SEPTEMBER 1981

REG 4 SEPTEMBER 1981

REG 14 SEPTEMBER 1981



REG 13 OCTOBER 1981



REG 20 JANUARY 1982

FIGURE IV Cumulative distribution of events in both Lake Sinclair and Lake Oconee.